

# AUSTRALIAN communications

AUGUST 1993

The Networking and Telecommunications Management Magazine

\$5.50

**E-MAIL BACKBONES**  
Making sure the mail gets through

**GLOBALISATION**  
Is the medium the munition for telcos?

**SINGLE STATION  
NETWORK  
MANAGEMENT**

**X.25**  
Reports of its death greatly exaggerated

**ROUTERS**  
Data compression remains a proprietary proposition



By the time  
we were twelve  
months old, we'd  
built one of the  
world's most  
advanced digital  
mobile phone  
systems.



In our short lifetime, you may be surprised by what we've been able to achieve.

Anyone who's made a long distance or mobile phone call will know how we've helped lower costs and raise standards of service.

However, you may be less aware that, in just twelve short months, Optus Mobile have

as one of the most advanced in the world.

Among the many advantages will be clearer, cleaner speech reproduction.

(Just like your CD player uses digital technology to sharpen up your hi-fi at home.)

And you'll be able to enjoy all kinds of other useful benefits, such as longer talk time,



built a new and revolutionary phone system.

The Optus Mobile Digital Service, as it's known, was developed right here in Australia.

Our team of technical wizards created the digital network, the new transmission sites and even fine-tuned the digital handsets.

The result is a phone service that's regarded

greater security, as well as a personal answering and personal message service.

Remember though, this is only what we've accomplished in our first year.

Just imagine what Optus might be capable of as a mature two year old.

**'yes'**



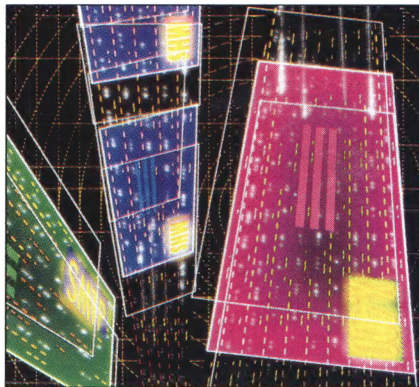
**OPTUS**  
communications

*For more information about the Optus Mobile Digital Service, just call Optus on 008 555 000.*



# AUSTRALIAN communications

Cover: John Dymond Photography  
Special thanks to NSW State Rail staff for their  
kind assistance with this month's cover photo.



## NETWORK MANAGEMENT 65

By now every network administrator has been bombarded by publicity about the advanced management capabilities of every piece of network product available, from hubs, bridges and routers to network operating systems and applications packages. Slick presentations, where maps of a WAN are clicked upon to reveal LAN diagrams which in turn reveal real-time colour status diagrams of each network device waiting to be automatically reconfigured are fine, but do they represent real-life? Graeme Le Roux argues that the problem is that setting up network management is not that simple, nor is it always possible to unify the functions of management found in any large network.

## ENTERPRISE E-MAIL 79

For an enterprise-wide messaging backbone to be really effective in helping users communicate, it needs to be able to pull together the range of different mail systems typically running within an organisation. Until recently, that's been a tall order, even for the most technologically astute companies, but now that the first products that conform to the extended version of the X.400 messaging standard are starting to appear, establishing a messaging backbone need no longer be so hard. And some of the familiar alternatives to X.400 like SMTP and MHS have been beefed up to offer advanced features such as security, distributed directories, and extensions that add images to text.

## EXPLORING X.25 87

The most recent technical developments invariably attract the attention of the vendors and users, and therefore the majority of marketing activity in the internetworking business — hence the recent focus on ATM and, before that, frame relay. The unfortunate thing about this is that established technologies can sometimes be ignored in the rush to jump on the latest passing bandwagon. A classic example is X.25, the packet switching technology which may now be reaching a venerable age, but nonetheless continues to maintain a large share of the data communications market. Kevin Slatter takes a fresh look at X.25 and its future.



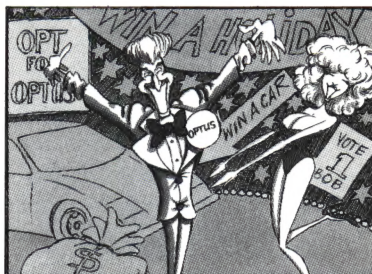


## GLOBALISATION

95

While it's fashionable to discuss the globalisation of the telecommunications business, not all commentators are in agreement as to what it actually means. Many put forward the notion that the ownership of public telecommunication operators is becoming more internationalised, while others focus on international investment by telcos in their peers and present laundry lists of past and prospective privatisations. Inherent in this analysis is the idea that ownership of telcos is becoming more concentrated and that one day soon there will be only a handful of global players. But are analysts looking in the right places for signs of globalisation? Dr Sam Paltridge examines the perceived trend toward the globalisation from a different perspective.

## ANALYSIS



### 21 The Beauty Contest Begins

In line with the democratic traditions maintained by our neighbours to the north, Optus is offering cash to help ballot voters decide.

- 22 Telecom's New Advertising Image
- 23 New Zealand's TDMA Turmoil
- 24 Telecom's Switch in Time
- 24 Olex Cables Succeeds in Asia
- 26 Competition Lives in the UK
- 28 Born-Again IDAs

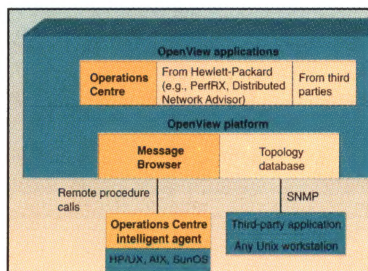
## TECHNOLOGY

### 33 Putting the Squeeze on Routers

A dearth of standards means that data compression for routers is a strictly proprietary proposition.

- 34 Market Watch
- 36 Managing Past Pretty Pictures
- 38 Microsoft's New Architecture
- 38 Technology Update
- 40 Intel, Microsoft Target Telecoms
- 43 LAN Views — Graeme Le Roux
- 44 Telecoms — David le Comte
- 46 OSI Tutorial — Alan Lloyd

## PRODUCT LEADERS



### 51 HP's Operations Centre

The new HP OpenView Operations Centre oversees all network file servers, workstations and applications.

### 52 INC Stacks Up With the Best

INC has added a stackable Ethernet hub and SNMP-based management software to its product line.

### 54 Opening the AppleTalk Gate

Webster's new Multiport/LT simplifies the connection of AppleTalk and Ethernet networks.

## OPINION

**62 Tom Amos** discusses Telecom's reported interest in securing a stake in the Seven Network. He argues that it would be a disastrous step.

**63 Bill Melody**, Director of CIRCIT, contends that the preselection ballot is an unnecessary waste of time and money which should be stopped.

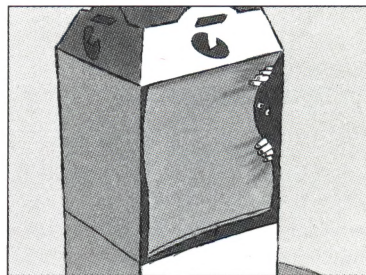
## INTERVIEW



### 59 Jonathan Parapak

Secretary General of the Indonesian Ministry of Tourism, Posts and Telecommunications, Jonathan Parapak has direct input into one of the fastest growing markets in the world.

## LEGAL LINE



### 55 Information Privacy or Piracy?

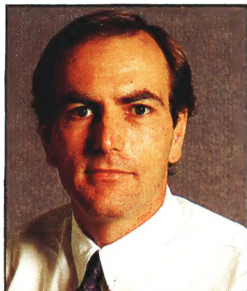
Peter Leonard and Gigi Cheah review the very loosely defined concept of Information Privacy Rights and how they sit with telecommunications technologies in Australia.

## DEPARTMENTS

VIEWPOINT	6
LETTERS	8
UPDATE	16
PRODUCT FILE	105
THE PTC VIEW	115
THE ATUG PAGES	117
CALENDAR	122



## Time to Pause?



This month's edition devotes more than three pages to the debate about GSM and the increasingly recognised problems of it and other TDMA-based cellular mobile systems — although 'debate' is probably a poor word to describe what so far has been a fairly one-sided dialogue. While this magazine is not a proponent of far-fetched conspiracy theories involving elaborate international cover-ups, it is interesting to note that there has so far been little in the way of denial of GSM's problems by its proponents. Hopefully, in the months that lie

ahead we'll see a more complete picture of GSM emerge from all of those involved. Until then, calls that the GSM roll-out should be stopped or at least put on hold will continue to go unanswered.

But perhaps GSM isn't the only thing which should be put on hold. The millions of dollars now being spent by the carriers on the preselection ballot has struck many as an enormous waste of resources on the sort of competition we don't need. On page 63, CIRCIT's Professor Bill Melody presents a strong case as to why the ballot is ill-conceived and needs to be reconsidered. He argues that it 'does not promote efficiency, improve service, reduce prices or improve consumer choice.' Furthermore, the expensive public education campaign won't help consumers choose, and 'the carrier advertising hype will be encouraging an emotional, not a rational choice.' All-in-all, the ballot 'will increase Optus' market share in the short run, but won't make competition more effective.'

*MA Smeaton*



### Hewlett-Packard 95LX Palmtop Competition Winners

July 1 saw the prize draw for our latest subscription competition, in which subscribers were given the chance to win one of three Hewlett-Packard 95LX Palmtop computers with built-in Lotus 1-2-3 software, valued at \$1,000 each. The lucky winners were Andrew McPherson of Honeywell, William Noble of Telecom, and Peter Hickey of Dynamic Technology. The winning entries were drawn from the box by Arthur Booth of Hewlett-Packard's Test and Measurement Division, assisted by *Australian Communications*' Assistant Editor, Sarah Parkes. *Australian Communications* congratulates each of the winners, and thanks Hewlett-Packard Test and Measurement for its support.

## AUSTRALIAN communications

### EDITOR

Mark Smeaton

### CONTRIBUTORS

Tom Amos, Stewart Fist, Liz Fell, Peter Leonard, Peter Waters, Stuart Corner, Graeme Le Roux, Bill Bennett, Bernard Levy, Alan Lloyd, Robert Clark

### ASSISTANT EDITOR

Sarah Parkes

### PRODUCTION MANAGER

Samantha Keats

### ILLUSTRATIONS

Samantha Keats, Louis Silvestro

### SALES AND MARKETING DIRECTOR

Craig Burkill

### CHIEF FINANCIAL OFFICER

Jennifer Stibbard

### Subscriptions

*Australian Communications* is available by paid subscription for \$54 per annum. Subscribers receive eleven issues per annum.

Overseas Rates by Air	1 Year	2 Years
New Zealand, Papua New Guinea	\$66	\$110
Singapore, Indonesia, Malaysia, Brunei, Pacific Islands	\$72	\$122
Asia — including Hong Kong, India, Korea, Japan, Taiwan	\$78	\$133
Europe, North America, Middle East, South America	\$92	\$168

### Publishers

Published and distributed monthly by Ostasun Pty. Ltd. (ACN 003 606 102) under licence from ACP Computer Publications, a division of ACP Publishing Pty. Ltd. (ACN 053 273 546) of 54 Park Street, Sydney NSW 2000. ISSN 0818-9021. Address: Level 4, 541 Kent Street, Sydney NSW 2000. Tel: (02) 264 2200 Fax: (02) 264 2244.

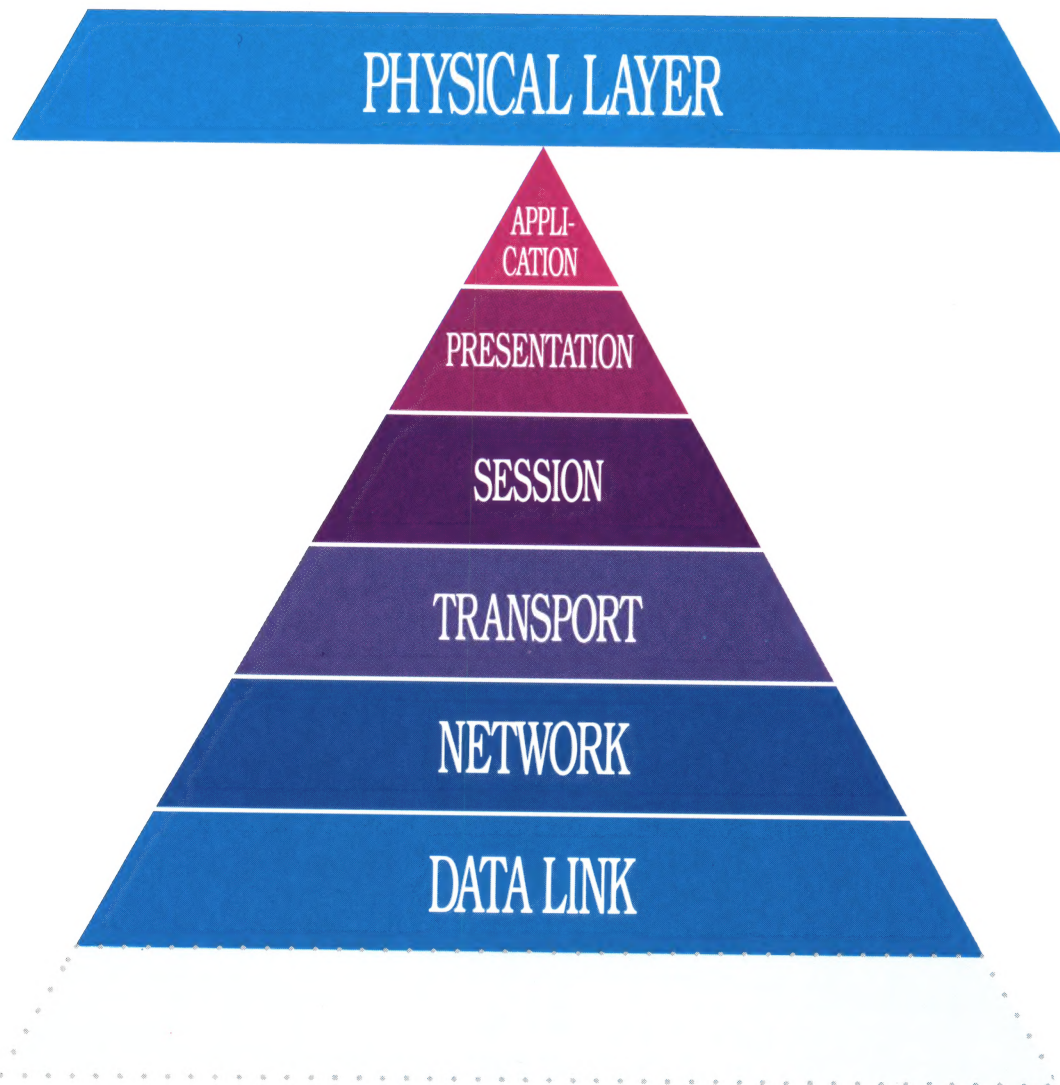
Printed at **Offset Alpine Printing**, Derby & Wetherill Streets, Silverwater NSW 2141

All material contained within *Australian Communications* is protected under the *Commonwealth Copyright Act 1968*. No material may be reproduced in part or whole without written consent from the copyright holders. Articles reprinted in this issue from *Data Communications* (USA) are copyright 1993 by McGraw-Hill Inc. All rights reserved. Published from *Data Communications* with the permission of McGraw-Hill Inc., 1221 Avenue of the Americas, New York, New York. Reproduction in any manner, in any language, in whole or in part without the prior written permission of McGraw Hill Inc. is expressly prohibited. The opinions expressed in this magazine are not necessarily those of the publisher. We welcome feature articles from contributors. Manuscripts should be typewritten and all text, photographs and illustrations must be accompanied by a stamped, self-addressed envelope stamped to the appropriate value. Retain duplicates of both text and illustrative material; Ostasun (Pty. Ltd.) does not accept responsibility for damage to, or loss of material submitted for publication.

Member  
of the  
Audit Bureau  
of Circulations







## Are you making physical layer decisions a top priority?

The wiring system, or physical layer, upon which your entire communications system is built may only constitute a small portion of your investment but can cause the vast majority of your network problems. How can you be sure, with technology and industry standards changing so rapidly, that your system can run the high speed applications your business demands?

You can call Anixter. We have made the Physical Layer our business. We play a vital role in all the standards committees, but standards alone aren't the answer. You also need to sort out the wide array of available technologies. Only Anixter can help you do that. We provide solutions that meet your specific requirements. For Total System Performance, call Anixter.



**SYDNEY: 61 2 333 0800 • MELBOURNE: 61 3 526 3617**

ANIXTER AUSTRALIA PTY LTD: Unit 6, Waterloo Business Centre 44-48 O'Dea Avenue, Waterloo NSW 2017

©1993 ANIXTER BROS., INC.



## GSM's Problems — The Facts

Over the past few months there has been a growing storm of protest over the potential for GSM to cause harmful interference to electronic devices and particularly to hearing aid users. These protests have now been taken up by the specialist technical press, who have begun to call for the suspension of GSM services until a full investigation of the interference and its ramifications can be undertaken. With the investment that is at stake, billions of dollars worldwide, such a step would have disastrous consequences for the manufacturers, the operators who have committed to the GSM standard and in Australia, for our entire industry. Considering the importance of this issue I would like to set out the facts, free of sensationalist claims and impractical urgings.

According to Gareth Powell, writing in the *Sydney Morning Herald*, GSM will cause unacceptable interference to hearing-aid users and could cause car-safety devices such as air-bags and anti-lock braking systems to malfunction. Powell has referred to an article by UK communications expert, Steve Gold, in reviewing a GSM phone which claimed 'massive interference to AM radios and hearing aids within a five metre swathe around the phone and general malaise of all radio equipment within that area.'

He also reports an unnamed technical journalist as claiming 'It [a GSM phone] interferes with any and all electronic apparatus in the vicinity; when I tried to make a call in the office, all the PABX phones within three metres were swamped by a loud buzzing noise and my modem expired.'

Stewart Fist is another journalist who has been a strong and vocal critic of GSM. Writing in the June issue of *Australian Communications* he referred to 'unacceptable interferences' being experienced in Telecom trials of GSM terminals. He has expanded on this point in several articles in the July issue of *Australian Communications* (see 'Grand Scale Mistake' and 'Will GSM and D-AMPS Give Way to the CDMA Push?').

In those articles Fist makes it clear that he is a fervent supporter of Qualcomm's CDMA technology as a solution to the interference problem.

Fist claims that GSM designers were well aware of the inherent interference caused by TDMA transmission (equally applicable to the US D-AMPS and the Japanese digital standard) and sought to minimise this in their equipment design. Despite this attempt Fist argues that they failed to take into account low frequency harmonics generated by the on-off switching of the transmitter. According to Fist this is a problem in Australia but a much larger problem in the US, where digital has been introduced within the existing analogue band.

Fist quotes Gerry Flynn, Chairman of the American TIA 45.5 Subcommittee as saying 'It's (TDMA) a disaster worldwide . . .' But it is worthy to note that TR45.5 was established specifically to develop performance, compatibility and interoperability standards for Wideband Spread Spectrum Digital Wireless Communications Systems. Thus he (Flynn) would appear to have a vested interest in the success of the CDMA standard.

Fist makes no bones that he believes that CDMA is a better proposition than TDMA, citing the higher capacity gain of the technology, its operation below the normal noise threshold (hence non-interfering) and the robust nature of the CDMA air-interface. He also makes much of the power control feature of CDMA and its ability to increase battery life and use in microcellular situations. In that regard, however, I would note that GSM has a similar feature.

Fist concludes that the strong support that CDMA is now receiving in the United States is directly related to the interference problems with GSM. He particularly singles out Nokia's agreement with Qualcomm as an act of corporate survival in recognition of the magnitude of that problem: 'I hope for Nokia's sake that things work out well; its executives had virtually staked the company on the success of GSM, and so you can mark the European realisation of the extent of GSM's interference problems by the date at which Nokia joined hands with Qualcomm.'

There is no doubt that Qualcomm have been very successful in the United States in gaining the status of a formal standard by the Telecommunications Industry Association (TIA) for the technology they have championed for the past five years. But I believe that Nokia's decision had little if anything to do with interference and had much more to do with their recognition that CDMA has certain distinct advantages; particularly in terms of capacity in dense urban environments. Put simply, Nokia didn't want to be left out if the CDMA market took off.

But Fist's comments also ignore the fact that GSM is an intelligent network specification, not just an air-interface. In that regard it is not beyond the bounds of probability that we could see a CDMA air-interface for GSM in the future. Nokia's — or for that matter any of the other manufacturers — investment in GSM, is therefore not at risk.

### Questions to be Answered

Despite this, there is no doubt that the serious questions raised by Fist and Powell deserve a thorough and complete answer. The interference of GSM Mobile Stations (MS) with electronic apparatus has been known for some time and has already been the subject of exhaustive investigations overseas. Last year, ETSI issued a detailed technical report on EMC Considerations related to GSM. That report found that the generic immunity standard, EN 50082-1, produced

by CENELEC, calls for immunity to electromagnetic fields of 3V/m.

According to ETSI, current hearing aids have immunities close to this level, but a hand-portable GSM transmitter is likely to present a field strength greater than this at regular intervals in a crowded environment. ETSI's solution to this 'potential' problem was a combination of increased hearing aid immunity and constraints placed on the GSM system in urban environments.

Australian Hearing Services (AHS) in their submission to Austel's PCS Inquiry reached similar conclusions about the interference, although they noted that the extent of the problem with hearing aids varied between less than 0.5 metre for an in-the-ear (ITE) model to 20 metres for a behind-the-ear (BTE) model. AHS claimed that regardless of the model all hearing aid users will be effectively precluded from using GSM and many will be interfered with by nearby GSM users.

A similar submission to the Austel Inquiry was received from Phonak Hearing Instruments. They, like AHS, claimed that the problems caused by GSM to the hard of hearing had been overlooked or pushed aside, particularly in Europe.

According to Phonak, the telecommunications industry in Europe has shown little sympathy for the plight of hearing-aid users and has given no indication that they are prepared to cover the costs involved or co-operate in the solution.

Australia — and Telecom in particular — has been more concerned, as noted by AHS: 'We appreciate that, unlike their European counterparts, Telecom has shown concern about the possible adverse consequences of GSM and have taken the initiative to work with us to investigate and find solutions to the problems.'

But Telecom's investigation, carried out jointly with the National Acoustic Laboratories, earlier this year, was not able to offer any panacea. Although several design modifications for hearing aids were suggested, Telecom admitted that it was not known if the modifications would work and that modifications to existing hearing aids may be logistically difficult, if not impractical.

The inevitable conclusion, despite Telecom's call for further investigation of the problem, is that they believe there is little that they can do and they are adopting a wait-and-see attitude to see if the hearing-im-

### WHERE TO WRITE

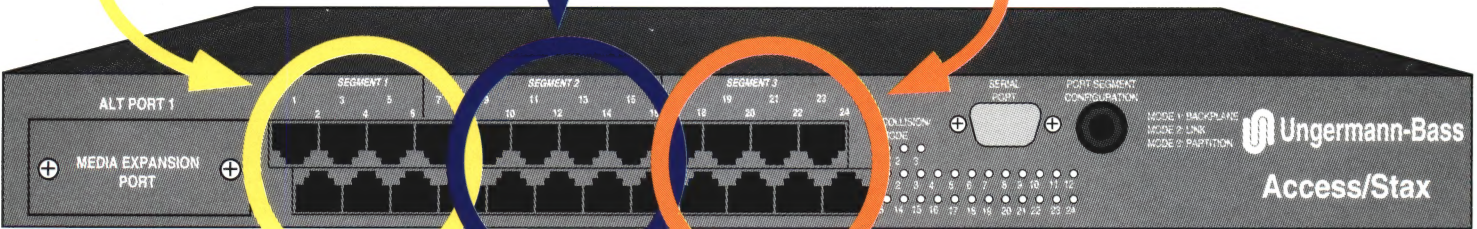
Letters to *Australian Communications* should be addressed to: The Editor, *Australian Communications*, Level 4, 541 Kent St, Sydney, NSW 2000. You can fax your letters to (02) 264 2244. Letters may be edited for clarity and length.



# HALF-PRICE ETHERNET\*

**Ungermann-Bass attacks the cost of managed enterprise networks**

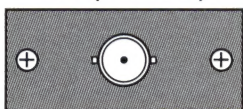
Gives you the flexibility to either assign each group of eight ports to one of five backplanes, or remain independent



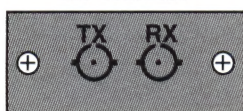
## Optional Media Connectors



DB-15 connector  
AUI (Thicknet)

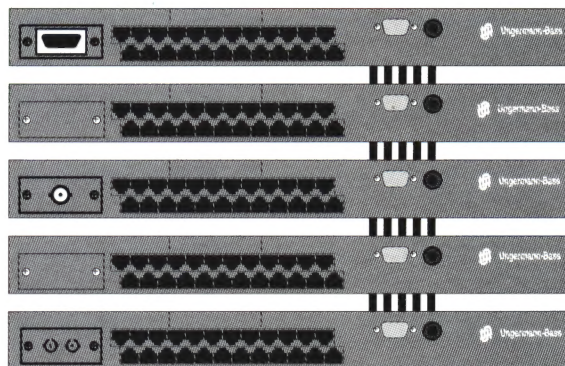


BNC connector  
for Thinnet



Fibre (FOIRL)  
connector

Flexible support for non-UTP media providing cost-effective options for current and future network requirements



Flexplane acts as five backplanes plus management bus

Expandable to five hub stacks, supporting up to 15 Ethernet segments and 120 ports

**SNMP MANAGED  
ACCESS/STAX FOR  
AROUND \$150 PER  
PORT \*\***

## BUILT-IN MANAGEMENT

Cost effective real-time management.  
SNMP management to 802.3k standard

## NETWARE OPTIMISATION

Fully compatible with Novell's NetWare Hub Services (HUBCON) and Hub Services Manager (NMS/HMI)

## INTEGRATION

Fully integrates with Ungermann-Bass' enterprise network management architecture

\*Comparing Access/Stax to price of three leading managed Ethernet hubs

\*\*Offer valid until 30th September, 1993.

Based on 120 port bundle ex-tax

**For further information contact Ungermann-Bass on 008 814 499**



paired community is going to make a big enough noise about the inconvenience.

Well what we should we do about this problem? As it happens, none of the submissions actually advocated turning off GSM while a solution is found. Even the submission by Qualcomm, despite its voluminous size, did not mention the interference advantage of CDMA, or call for any such drastic action.

The obvious solution, at least as far as new hearing aids are concerned would be to increase the resistance of that equipment to external interference. ETSI, for example, has suggested in its investigations that the immunity of new body-worn apparatus should be increased to 10V/m '... since this has been found to significantly reduce the probability of GSM interference.'

But hearing aids are just part of the problem, as has been pointed out earlier. What about all the other electronic items that are all-pervasive in our everyday life in the home, the office and our cars? The investigations of Telecom and others have shown that a handheld GSM mobile telephone can generate a field strength of 15V/m at a distance of 0.5 metres. Clearly the generic EMC immunity standard of 3V/m is totally inadequate in these circumstances, and maybe even 10V/m is too low.

It would seem that the development of a realistic set of EMC immunity standards will be essential if the predictions of GSM market growth occur. The problem is that to be effective, those standards would need to be adopted internationally, not just in this country. What we need is for Austel to take a lead in this matter by recognising the serious nature of the problem and working towards the development of a sensible immunity standard in conjunction with bodies such as ETSI. In the meantime, the operators, and the Government, need to take every step to ensure that the community is informed of the possible consequences of harmful interference so that they can take appropriate precautions.

**Maurie Dobbin**  
Teleresources Pty Ltd  
Sydney, NSW

## GSM: Another European Bungle?

As a cellular consultant, I've been involved five times in the last two years in GSM network proposals (all but one in Asia). In every case, after evaluating their particular circumstances I advised the parties that if GSM was their only choice then they had to decide whether they wanted a commercial proposition or simply wanted to operate a cellular system, because making GSM commercial is not easy and perhaps impossible (if it has to compete with AMPS or TACS).

As early as 1990, when the first edition of my book *The Cellular Radio Handbook* was published, I warned against blind faith in digital systems; I made that warning even stronger in the second edition. The rush to digital is not driven by a need for capacity (as is often argued), but is fuelled by European carpet baggers, hocking their second rate goods to Third World countries whose administrations don't have the resources to properly evaluate what is put in front of them.

I witnessed a particularly blatant attempt at recent seminar in Africa, where a huge contingent of German and French salesman descended on a cellular conference organised by Telecom Australia with the intention of selling GSM. A more inappropriate technology for the region is hard to imagine. With help from the non-European participants (including AT&T, Hughes) I was able to put them straight. Most said it was the first time they had heard the downside of GSM.

Travelling around I frequently get asked: "If GSM is so bad then why is everybody going that way?" The answer is that everyone isn't. Europe chose GSM for political reasons, and in many ways GSM is a political creation. The former USSR and its satellite states 'chose' GSM because the European soft loans which are funding it came with strings attached.

But word is beginning to filter out that GSM is not as good as it could be. Stewart Fist has correctly identified a major problem with the very nature of TDMA systems — interference. This interference is real and probably cannot be corrected in any satisfactory way short of recalling all existing GSM equipment. It has been demonstrated to affect hearing aids, conventional cellular telephones, wireline phones and pacemakers; it has been known to prevent modern micro-processor controlled cars from starting (and make then misbehave in the vicinity of base stations) and destroy computer screens.

Okay, so GSM is going to be difficult to live with, will probably send a few near-deaf

people completely deaf, cause a few accidents and make its presence felt to all sorts of people as a soon to be familiar, 'GSM buzz.' And everyone knows the mobiles are big, ugly and expensive. That's the downside. But is there an upside?

Numerous tests have been conducted that reveal that the subjective voice quality of GSM is about as good as analogue, with roughly equal numbers of listeners preferring GSM to the number that prefer analogue. No gains here.

Originally GSM was supposed to offer a higher density capability than analogue, because of its better performance in its own interference environment. At one time it was said to offer three times the user density of an analogue system (a modest gain, but nevertheless a gain). This was recently revised downwards to 2.5 times, then 2 times and it's still falling. For various reasons, it is my assessment that it will finally never be able to meet densities much beyond 1.5 times that of analogue.

GSM was originally feature-packed. The concentration of the GSM committees was heavily on features, and very little effort was put into the basic technology, which is rather crude, expensive and difficult to implement. Although the whole package is a rather wonderful and thorough thing, even the ETSI committees which originated it soon realised that it was more of a wish list than a practical design specification. So they introduced a Phase 1 version, which has less features than an analogue system, and lacks frequency hopping, which is perhaps the only really innovative part of the GSM concept; it is also the part that makes it work better in a high frequency-re-use environment. So we have less features than analogue.

As a system designer, I find the most unforgivable shortcoming is that GSM does not have the range or building penetration power of even the most basic analogue system. This means that in-building coverage will be poor; calls will drop off in rural areas,

### Comparing Digital Systems

	AMPS TABS	NAMPS	GSM	DAMPS	E-TDMA	CDMA
Voice Quality	6	6	6	6.5	6	9
Capacity	6	7.5	7	7	8	9
Security	3	3	8.5	8	8	9
Fraud Resistance	2	2	9	8	8	8
Rural Applications	8	5	4	4	4	9
Building Penetration	7	5	4	4	4	8.5
Handheld Cost	9	7	4	6	6	6
Handheld Size	9	6	6	6	6	6
System Cost	8	8	5	6	7	8.5
Roaming Availability†	4	4	2	0	0	0
Score	62	53.5	55.5	55.5	57	73

† Working systems worldwide where roaming is physically available

Source: *The Cellular Radio Handbook*



# BANKSIA

## A better class of fax/modem.



## Excelling in quality and service.

Banksia Technology's extensive range of fax/modems offers the ideal solution to all your fax and data communication requirements, from the simplest to the most demanding business applications. All Banksia fax/modems are of Class II standard, offering the highest level of features and functions.

Our range includes high speed V.32 bis models, incorporating V.42 Error Correction and V.42 bis Data Compression, which offer a facsimile send-receive rate of 14,400 bps. Even our basic models offer a fax send and receive rate of 9,600 bps.

Apart from having superior speed capabilities, you'll also find your Banksia fax/modem incredibly efficient, reliable, and easy to use.

At Banksia, we are committed not only to providing you with products of premium quality, but also to offering you the highest standard of after sales service and support, including unlimited technical backup, and extended warranties. In short, a Banksia fax/modem represents the best possible value for your money.

Banksia fax/modems are fully designed and engineered in Australia incorporating the most advanced

technology. They are made to conform to the highest standards of performance and reliability. All Banksia fax/modems have full Austel approval.

And remember, when you buy Banksia you are buying Australian!

**For the name and location of your nearest Banksia dealer call or fax us today, Phone (02) 418 6033 Fax (02) 428 5460 or fill in and mail us the coupon below.**

# **Banksia**

M • O • D • E • M • S

BANKSIA TECHNOLOGY PTY LTD ACN 003 594 349  
83 Longueville Road, Lane Cove NSW 2066

Name

Company

Address

Postcode

Phone  Fax



and overall call quality will be unlikely to match that of an analogue system. Quantifying to what extent GSM is inferior to say, analogue AMPS, is difficult, because few definitive studies have been done. It does appear, however, that the short-fall in the path-loss budget is around 10dB. That means that a GSM site co-located with an AMPS site would have about half the range. In practice, this means lots more base stations to cover the rural areas, and in the cities, it means base stations everywhere just to get coverage. Base stations everywhere in turn means lots of interference and problems. I have always taken great pride in designing systems that work well. With GSM, the designer's hands are tied.

In the table [on page 10] I have compared the digital systems with the dominant analogue systems and NAMPS, an analogue system with the same capacity as most of the digital systems. It will be seen that by this assessment — which by its nature must be subjective — that all of the digital systems except CDMA have failed to meet one of their basic criteria which was 'to be at least as good as analogue.'

It must be admitted that when Austel chose GSM the above ratings were not clear, and all of the systems were on the drawing board. Rather than wait, Austel rushed in and took a guess on the outcome. They were wrong: gamblers always lose.

**Neil J. Boucher**  
Brisbane, Qld.

#### Stewart Fist comments —

I first wrote about Australia's choice of GSM as the digital mobile standard in *Australian Communications* back in July 1991 ('Freezing GSM — The Right Decision for the Wrong Reasons?'). Then in February 1992 ('GSM — Why Are We Rushing to Embrace it?') and again in April 1992 ('GSM: Trials and Tribulations'). I also made an ATUG '93 conference speech revealing some of GSM's problems, and following this up with more articles recently. So I've certainly taken a lead position in publicly criticising this technology.

The GSM industry is hitting back — and that's both expected, and desirable. It is about time some of these points were argued out in public; they've been muttering behind closed doors in Europe for long enough.

But three times in the last year I've had specific invitations to speak at conferences on GSM, withdrawn — twice (at least) at the request of Telecom. The dirty tricks have now started in earnest.

Recently, three 'suits' from Telecom took *Sydney Morning Herald* journalist, Gareth Powell, to lunch to implant the idea that I'm a paid agent of Qualcomm in promoting CDMA. (For the record: the only payola I've ever received from Qualcomm is a cup of coffee. I paid for my own visit to San Diego to look at the CDMA trials, including all meals and accommodation. I strongly believe that people

who purport to be journalists should reveal any financial connections of this kind.)

Maurie Dobbin has also recently published a four-page diatribe attacking my position in his *Mobiles* newsletter. He painted me as a buffoon whose views shouldn't be taken seriously, and attempted to 'balance' my views with a wealth of what he called 'facts.' Like the 200-odd technical papers that have been given at GSM and mobiles' conferences over the last two years, Dobbin's piece omitted to mention hearing-aids and failed to address problems of direct interference with analogue and digital circuits. If Dobbin had been reporting on Hiroshima in 1945, presumably he wouldn't mention bomb-damage either.

Dobbin's letter to *Australian Communications* this month (now that the story is out) concentrates on the hearing aid and circuit interference problems, so I am pleased to see that the GSM advocates are finally coming clean with the public. However the proposed 'solutions' all focus on setting 'immunity' standards through shielding.

Would it have been valid for the manufacturers of DDT to insist that birds should lay impermeable eggs? Is the solution to the asbestos-in-schools problem that children wear higher-quality 'immunity masks'? What rubbish! These 'experts' are viewing RF interference pollution the same way Victorian coal-vendors viewed London smog — as undesirable, but inevitable! As Dobbin admits: 'Telecom's investigation, carried out jointly with the National Acoustic Laboratory earlier this year, was not able to offer any panacea.' And for once, he has got it right.

This is the problem — interference is intrinsic in GSM. If thousands of the world's top European electronics designers haven't been able to solve the problems since (at least) 1989, then I doubt that Australian committees are about to make a major breakthrough.

We need to keep stressing that this is not an 'immunity' problem — it is an 'emission' one. And the problem is instantly solvable, since it is readily admitted now that GSM currently offers little (if any) user-value over non-emitting AMPS.

And Dobbin rightly points out that the carrier infrastructure built for GSM is transferable to CDMA, so their money won't be wasted — it will just be put on hold for 12 months until a vastly superior non-polluting digital technology becomes available.

The most recent battle took place at the Austel forum on its draft Wireless PCS report — which recommends GSM, DECT and PCS-1800 (all TDMA) as the way ahead for Australia. I initiated this donnybrook myself, because I took exception to the claim that 'Scientific studies have been performed seeking association between the development of cancer and exposure to radio frequency emissions, but no such linkage has been established.' And to the statement that '[a] great deal of work has already been done, and there is no generally accepted evidence that

such *radio frequency* emissions play a role in the promotion of tumour growth.' [My italics — what about low-frequency?]

Austel's spokesman, Grant Symons, suggested to the forum that the cellular dangers were only in thermal heating of the brain from microwave emissions. But recently it has been discovered that microwave ovens have effects, other than thermal, on the food being cooked — they seem to cause changes in the protein structure of meat.

The fact is that GSM introduces new features into the cellular health concern, and this can no longer be treated as merely urban myth. The pulsed high-power of the transmission could conceivably produce quite different effects to the low-power constant transmissions of AMPS. This is one of the factors that the US FDA's Centre for Devices and Radiological Health is worried about.

Ross Ramsay, from Optus, claimed that I was 'alarmist,' and expressed the opinion that years of experience with the pulsed emissions from radar had established a 'no-worries' case. Since any survey of citizens who have spent a decade with radar units strapped to the side of their heads must, of necessity, be statistically suspect, I decline to accept the Optus assurance.

No one is pressing the panic buttons here — but the scientists are saying that the world needs to have some rapid and substantial research done before the negative case can be accepted. There is bugger-all research in this area worldwide. It is established that these ELF/RF emissions hit hearing aids and electronic circuits at distances of a room-width or more with enough power to knock out modems and make the remote controls of TV sets malfunction — so what do they do to biological circuits and the lens of the eye at 10 cm? These same ELF emissions are the source of concern about computer displays and power-lines, and here the evidence has recently become a bit more conclusive.

A 1992 Swedish study by the Karolinska Institutet ('Magnetic fields and cancer in people residing near Swedish high-voltage power lines') is now widely accepted as being the first to establish a definite case that ELF health problems do exist.

These are low-level, but statistically significant, relationships: the researchers only found a two-times increase in childhood cancer rates associated with these very low ELF levels. But GSM levels are much higher and at different frequencies. Again, no one is hitting the panic button, but surely we can't be dismissive in the way that Austel and the carriers seem to be.

It is the statistical 'low-level of perceived risk' that is the problem here. Catastrophic causation is relatively easy to identify, and the damaging effects are usually then confined to only a small group. Long-term low-level effects, however, can permeate through a community and create massive adverse effects at a later time.



# BANKSIA

## A better class of modem.



## Excelling in quality and service.

Banksia Technology's extensive range of modems offers the ideal solution to all your communication needs. From the simplest to the most demanding business applications, you'll find that a Banksia modem has all the features and functions you require.

The Banksia range includes super high speed V.32 bis models with V.42 Error Correction and V.42 bis Data Compression, offering effective speeds of up to 57,600 bps. Even our basic models are capable of speeds up to 2,400 bps, and many of our modems also include 9,600 bps fax capability.

Overall, you'll find your Banksia modem not only fast, but also incredibly efficient, reliable, and easy to use.

At Banksia, we are committed not only to providing you with products of premium quality, but also to offering you the highest standard of after sales service and support, including unlimited technical backup, and extended warranties. In short, a Banksia modem represents the best possible value for your money.

Banksia modems are fully designed and engineered in Australia incorporating

**Banksia**  
M • O • D • E • M • S

BANKSIA TECHNOLOGY PTY LTD ACN 003 594 349  
83 Longueville Road, Lane Cove NSW 2066

the most advanced technology. They are made to conform to the highest standards of performance and reliability. All Banksia modems have Austel approval. And remember, when you buy Banksia you are buying Australian!

**For the name and location of your nearest Banksia dealer call or fax us today, Phone (02) 418 6033 Fax (02) 428 5460 or fill in and mail us the coupon below.**

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
Postcode \_\_\_\_\_  
Phone \_\_\_\_\_ Fax \_\_\_\_\_

AC08



At the risk of confirming my 'alarmist' tag, I would point out that the history of low-level statistically-determined health dangers, to paraphrase one commentator, 'include lead and mercury poisoning, coal miners' lung, asbestos, pesticides, herbicides, PCBs, Thalidomide, Agent Orange, smoking, etc. And in every case the public has long been fed a diet of denial and cover-up, followed by 'qualified' denial, mega-buck studies, and finally the disclaimer 'We were all ignorant at the time.'

But we are not totally ignorant. The US Food and Drug Administration recently issued an 'Advisory on cellular phones cautioning users against unnecessary exposure to the antenna.' And the US Congress recently forced the Cellular Telecommunications Industry Association (CTIA) to fund an independent panel of scientists (appointed by the FCC, the EPA and the Health and Human Services Dept.) to the tune of \$US1 million 'to try to determine the potential health risks.'

And that's enough for me, unless someone can demonstrate any over-riding reason why GSM is so important to Australia's productivity or cultural improvement that it justifies tolerating the interference and taking the health risks.

## How Many Jobs in a Name?

In your *Viewpoint* column in the May 1993 edition you make two statements that I wish to address:

1. '... and the UK company is no longer pretending to be part of a consortium with Australian interests.'

The shareholding in Vodafone Pty Ltd (incorporated in Australia) is:

- Vodafone Group Plc 95%;
- Australian shareholders 5%; and
- AAP Group Equity Options 10%.

The Board of Directors of Vodafone Pty Ltd will have a majority of Australian directors, both executive and non-executive.

The company will be majority Australian-owned by 2003, as per the government's wishes, and we have entered into binding obligations to this effect.

We never pretended to be anything other than that which we are. Our relationship with AAP is still in place. We have, however, decided to use the name Vodafone, which was mentioned in every press article concerning Arena GSM.

2. '... was at one stage going to create 5,000-10,000 jobs.'

As specified in our bid and detailed in our numerous press briefings, we anticipate hiring 1,000 staff in our own network company and creating a further 4,000 to 9,000 jobs in companies related to our business, such as airtime resellers and suppliers. In addition, our own airtime reseller and our value-added services company will be hiring staff.

These figures were always given as over a ten year period, and the final number was always stated as being dependent, obviously, on market share.

**Philip Cornish, Director  
Vodafone Pty Ltd  
Melbourne, VIC**

As I've pointed out previously, Arena GSM/Vodafone's successful bid for the third cellular licence was the most comprehensive and deserved of success. It was also the cleverest, emphasising as it did the prospect of '5,000 to 10,000' new jobs at a time of record unemployment and a looming federal election.

Forgive the cynicism, but I remain unconvinced that the jobs promise owed as much to rigorous calculation as it did to clever marketing. While it is true that in its earlier guise as Arena GSM, Vodafone had mentioned 1,000 direct jobs, it is also true that at around the time of the bid Mr Cornish was quoted in these pages as saying that Arena GSM would directly employ around 1,600-2,000 staff — a statement that he made no attempt to disavow at that time.

I also believe that the same clever marketing lay behind the decision to dress the Vodafone bid in the clothes of a transnational consortium, rather than simply bid as a foreign company. — *Ed.*

## RSA Patent Protection in Australia

That there is a security problem on open networks (*Research Notes, Australian Communications* May 1993) is beyond doubt — and the article succinctly illustrated the fact that encryption is the only truly effective method of achieving effective privacy in such instances. The public key systems described, in turn, are the only way in which the formidable key management problems, inherent in symmetric encryption systems such as DES (Data Encryption Standard), can be overcome. This is particularly the case in multi-user networks where there is not an established 'trust' between the parties.

However, the article suggests that the only widely used public key system, that developed and marketed by RSA, is 'patented in the US but not elsewhere.' This is misleading and we strongly assert that all public key encryption systems are subject to patent protection in Australia.

Whilst the RSA methodology per se is not able to be patented locally, the underlying 'public key' concept is. The original Hellman & Merkle patent claim is held to cover all public key encryption systems; a fact recognised by RSA themselves in their payment of royalties under this patent. The various intellectual property owners, including MIT (for RSA) and Stanford University (for Hellman & Merkle) have appointed

Public Key Partners as their worldwide licensing agent and, for any public key encryption product developed for commercial gain, their patent licence is required.

The licence fee is obviously included in the various software products and software toolkits marketed by RSA and other vendors — but it does not absolve other developers from paying just royalties for their use of this patented technology.

In any event, we suggest that the easiest, most successful and fastest implementations will come from the use of the software packages and applications toolkits developed by Dr Ron Rivest (the 'R' of RSA) of RSA Data Security Inc. These are finding widespread use with major software vendors. As Richard King, Development VP at Novell noted: "We considered doing our own thing — for about ten minutes! There are some things you can roll on your own, but not this."

**Nick Hough  
Hicorp Marketing Services  
Sydney, NSW**

## Ranking Telecom's Call Charges

Firstly I'll say that I'm a long-time employee of Telecom Australia (and *Australian Communications* reader). I do not always agree with my employer, certainly do not agree with the politicians (both main mobs), wonder whether ATUG has any compassion and care for those people who do not fit their mould; but I must take issue with: 'Australia's Expensive Local Calls' (*Update, Australian Communications* May 1993).

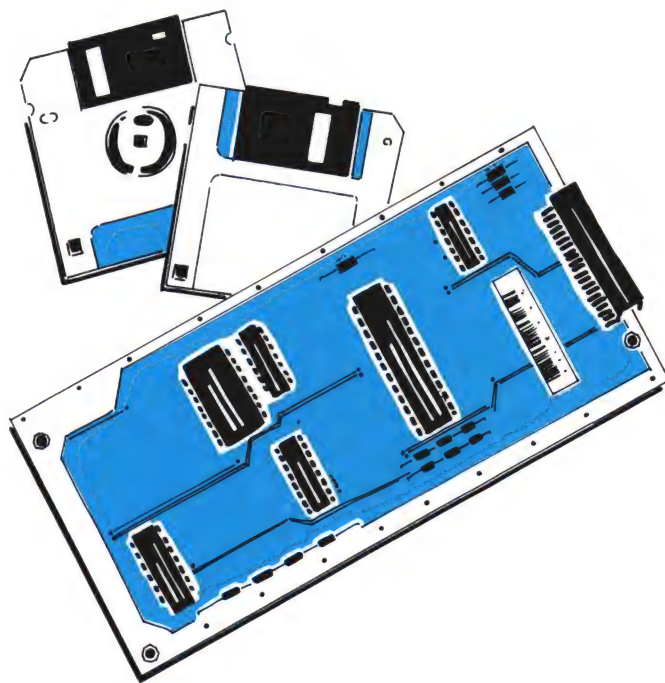
The manner of your presentation does not consider relative comparisons at all. Local calls within Australia are untimed (who else permits this?), our local call areas are vast (who else has local call areas as large or larger?), our market — with the exception of New Zealand — is small by comparison with the countries depicted. There is no equality in the data that shows the real cost to the consumer of the service provided.

Telecom Australia over the years has provided a quality of service which compares well with the rest of the world, and at a cost which if measured against a suitable index has been equal to or better than that charged by other national carriers.

It concerns me a great deal that we have had to continually suffer the knockers who mainly only care for their pockets or that of (big) business rather than considering the needs of Australians as a whole. Optus is being given a gravy train ride courtesy of the politicians and their mates, urged on by ATUG. I see no signs of Optus offering a local call service to all Australians as Telecom Australia now can. Enough said.

**Clive Robertson  
Scarborough, WA**





# **Check these Information Technology export facts. Then ask yourself why you're not in the network.**

**Europe is open for business.**

**Australia has some of the most sophisticated information technology products in the world.**

**Australian I.T. firms are making a big impact in the European market.**

**Australia will be a Partner Country at CeBIT '95 in Hannover which is the world's leading technology showcase.**

**Then ask us.** Austrade and State Governments are encouraging scores of Australian I.T. firms to participate in CeBIT '95. Europe remains a huge market for Australia, with large and small manufacturers in dozens of industries selling more than \$1 billion a year, with plenty of room for expansion. Austrade has a strategic network of offices in Europe covering 35 countries; countries just waiting for your product. We will find them for you.



**Phone the Austrade Export Hot Line on 13 2878.**



## The Ballot Battle Heats Up

The war of words in the lead up to the first preselection ballots became more heated last month as Telecom and Optus cranked up their campaigns for the Canberra and Sydney contests.

To win over Federal Government departments, Optus proposed (in late June) its Federal Government Advantage scheme, which, it claimed, could save participating agencies up to 20%

on long distance call costs. In addition, Optus revealed plans to offer 40 \$10,000 cash prizes to preselection ballot voters.

Telecom reacted strongly to the prize-draw ploy, with Director of Corporate Affairs, Chris Vonwiller, labelling it "demeaning" and accusing Optus of treating phone users with contempt. Optus claimed Telecom originally agreed to the concept

of both carriers offering incentives to customers and then later reneged on its end of the deal.

However, Vonwiller denied Telecom had ever contemplated using what he termed 'Lotto-style activities' as part of the balloting process.

The Public Sector Union also got into the act by signalling its intention to lobby its members to vote for Telecom.

## Telstra Korean Joint Venture

Telstra has signed a strategic alliance agreement with Korean firm POSDATA to market and provide value added telecommunications services in Korea and North East Asia.

Under the terms of the agreement, the two companies will establish a joint venture company by the end of 1993, which will pursue market opportunities in: EDI, including VANS and EFT; facilities management; international VANS, including frame relay and LANs; network integration; enhanced facsimile, including store-and-forward fax services; and a range of information services.

The joint venture has forecast revenues of \$400 million over the next five years, with Telstra receiving a 49% share.

Telstra had to compete with a number of other international operators, including BT, to win the deal. Telstra has also recently open a new regional office in Taipei to further bolster its presence in the Asian market.

## Austel Releases Draft PCS Report

Austel's draft Personal Communications Services (PCS) report has been released. The new hundred page document summarises a relatively small number of submissions from the industry — a point that didn't pass without comment from Dr Bob Horton, who urged interested companies to make up for the deficiency before the report was finalised.

Companies notable by their absence included AAP, Vodafone, Nokia, BellSouth, Motor-

ola and the two industry associations, the AIIA and the VAEIA.

The report represents a comprehensive coverage of the wireless telephone scene as it was in 1992, when most of the work was done. But as a guide to the future, it's lacking, mainly because it fails to address problems now known to exist.

However, it does attempt to set a structure in place, recommending that 'a National Strategic Focus should be bought to bear' through a body of manu-

facturers, carriers, consumers, lawyers and policy makers.

The Report also suggests a re-examination of the distinction between PMTS and PACTs, and recommends that all future decisions should be 'technology neutral.' Then, in the true bureaucratic spirit, it recommends four tightly-defined technologies — GSM for cellular, DECT for offices, CT-2 for Telepoint, and PCS-1800 for the local loop — and requests that frequencies be set aside for these.

## International Call Prices on Downward Trend

Australia's IDD call charges have fallen by 70% in real terms since 1979/80, according to the June quarterly report of the Bureau of Transport and Communications Economics.

The report says factors influencing the drop have been rapid advances in technology and greater competition between carriers.

Technological advances like compression and fibre optics have meant international telecommunications operators have been able to reduce prices without affecting profitability levels.

And while lack of competition in the past enabled carriers to maintain high charges, which were often linked to network de-

velopment goals and did not reflect the costs involved in delivering the service, an increasingly competitive market has driven prices down. The report predicts this trend will continue over the next decade, as Telecom and Optus offer incentives such as flexible calling plans in an effort to attract customers.

## SMA Starts Work

The Spectrum Management Agency officially commenced operations on July 1, with Christine Goode, a Deputy Secretary with the Department of Transport and Communications, as the Acting Spectrum Manager, pending finalising the appointment of the Spectrum Manager.

The Minister for Communications, David Beddall, said the SMA would continue to administer radio spectrum use through equipment licensing, but would also implement reforms including a review of apparatus licence categories and licence fees, a more efficient system of technical regulation of radio equipment, and a market-based system of licensing in selected parts of the spectrum.

The Agency will also have specific responsibilities for the new price-based allocation process for licences for the provision of microwave Multipoint Distribution Services (MDS).

PRICE PER MINUTE OF AN AVERAGE FOUR MINUTE CALL: 1992

		Country of Destination									
		Aus	Can	France	Ger	Italy	Japan	NZ	Sweden	UK	US
Country of Origin	Australia	—	1.16	1.24	1.39	1.24	1.55	1.00	1.24	1.16	1.24
	Canada	1.20	—	1.20	1.53	1.62	1.62	1.34	1.20	1.20	0.44
	France <sup>c</sup>	2.95	1.45	—	0.70	0.70	2.95	2.95	1.02	0.70	1.45
	Germany	1.88	1.88	0.69	—	0.69	1.88	1.88	0.78	0.69	1.88
	Italy	2.81	2.59	0.80	0.80	—	3.31	3.31	1.05	0.91	2.59
	Japan	1.93	1.93	2.47	2.47	2.47	—	1.93	2.47	2.47	1.58
	New Zealand	0.91	1.65	1.73	1.73	1.73	1.73	—	1.73	1.65	1.65
	Sweden	2.54	1.14	0.82	0.68	0.82	2.54	2.54	—	0.82	1.14
	UK	1.21	0.94	0.58	0.58	0.58	1.93	1.21	0.76	—	0.94
	US	1.71	0.67	1.22	1.26	1.25	1.69	2.06	1.21	1.07	—

Note: Figures represent the charge per minute of a four minute call (ex tax) expressed in US dollars

Source: OECD





Things have moved on: Victoria Police Radio, circa 1926

## New Emergency Services Network

Touted as the biggest of its kind in the world, the Victorian Public Sector Mobile Radio Network (VPS-MRN), became operational in late June. The network, which was developed and built by Telecom, makes use of trunked radio technology.

Telecom said the two-way radio network uses a similar principle to mobile phones, where each call is allocated a vacant channel which it uses exclusively for the duration of the call.

The new system is expected to have a number of benefits. It will enable police and emergency services to be fully interconnected, resulting in better response times, and will also improve communications for police in remote areas, who will have access to 95% of the State.

Telecom said the network will create several hundred jobs and boost export opportunities. It is developing a similar system in Indonesia.

## CBA Dumps OS/2 for NT

One of the world's largest OS/2 sites, the Commonwealth Bank of Australia, has announced it has ditched IBM's OS/2 operating system in favour of Microsoft's new Windows NT.

According to a spokesperson for the Bank, Microsoft went to great lengths to secure the contract, making the CBA the first site worldwide to have access to beta-test copies of NT and promising technology resources to help the process of migration.

The CBA currently operates over 1,400 OS/2 1.31-based networks. It will move from OS/2 to NT within the next two years.

The CBA's Assistant General Manager, Information Services, Mr Brian Morris, said the predominance of the Windows interface was an important part of the decision to change operating systems. IBM has not commented on the decision.

## Jtec Wins \$13.5m BT Contract

ISDN equipment manufacturer, Jtec, has won a contract to supply BT with over 500 of its J1000 ISDN multiplexers.

The 3-year contract, which was awarded through open tender and is worth more than \$13.5 million, forms part of BT's 10-year \$2 billion contract to supply the NSW Government with an advanced telephone and data network.

Jtec Managing Director, Mr John Reidl, said the contract came at the end of a very good year for the Australian firm, which has enjoyed growth of around 100% every year for the past five years. He said he believed Jtec had been awarded the contract because of the high quality of its equipment.

The company has also been shortlisted for a \$40 million contract to supply ISDN multiplexers to BT for its UK network.

## In Brief

**Nokia**, the world's second largest maker of mobile phones, has signed a four-year Fixed Term Arrangement (FTA) with the Australian Government. Under the FTA program, Nokia will establish a product development centre in Sydney, and has designated Australia a key site for GSM technology development.

**The Minister for Communications**, David Beddall, has officially launched a joint Telecom-Alcatel program which uses Remote Integrated Multiplexer (RIM) technology to offer advanced voice, data and video services to customers.

**Optus** has opened its new \$18 million Brisbane Exchange, and its long distance service is now available to Queenslanders.

**Australia's** telecommunications market recovered from a period of low growth in 1991/92 to record around 8% growth in 1992/93, according to the annual *Telecommunications Strategies Report* published by Paul Budde Communication. The report estimates total revenues in the Australian telecommunications market reached \$15 billion in the last financial year.

**Telecom's** Telecommunications Centre in Perth assisted in the successful recovery of the European Space Agency spacecraft EURECA by the space shuttle *Endeavour*. The Centre provided telemetry reception, tracking and ranging, and transmitted commands to place EURECA in the position required for recovery.

**Memorex Telex Australia** has signed an agreement with Cisco Systems which allows it to sell, install, support and maintain the entire range of Cisco products throughout the Asia Pacific region.

**BHA Computer** will work as a sub-contractor to Datacraft Asia to develop a billing system for a new X.25 network, as part of a major Malaysian telecommunications project.

**Cisco Systems** has announced the appointment of Com Tech Communications as a distributor of its Access Router range.

**Philips Defence Systems** has produced its 1,000th R-Switch at its Moorebank (NSW) plant, for US-based Hughes Aircraft. The R-Switch is a microwave electromechanical unit used in satellites to direct Ku band signals around the communications payload.

**EMAA**, the Electronic Messaging Association of Australia, has been formed as an extension of the EDI Council of Australia. Tom Hunt, a consultant with BHP Information Technology, is chairing the new body's formation committee.

**Alcatel** has become the first Australian organisation to use the Telecom Plus Tradelink system to establish seamless EDI electronic trading links with Europe via X.400. The interconnection gives Alcatel direct access to the European BRAINS EDI system.

**Telecom's International Business Unit** has joined BT, France Telecom, Deutsche Bundespost Telecom, Northern Telecom, Intel and IBM in the newly-established Multimedia Communications Community of Interest (MCCOI), which has been established to promote the development of multimedia technologies.

**Navigator Communications**, a subsidiary of Telecom, will offer a new range of management services following the signing of an MoU with Canadian telecommunications specialist, TSB International. TSB has appointed David Turik as its Asia-Pacific MD, and he will act as Navigator's General Manager for the time being.

**Telecom** has announced a 40% reduction in the cost of cordless phones and private base stations for its CT-2 mobile phone system, Talkabout. Telecom says the drop is in line with market demand pushing down the price of the technology.

**Cray Communications** is installing a wireless LAN system at Sydney's St Vincent's Private hospital, which will give health care professionals mobile access to the hospital's medical database.

**Fujitsu Australia** has bought a major stake in systems integrator Logical Solutions. The deal took effect at the beginning of July, with Fujitsu taking up a 67% shareholding in Logical, which will continue to operate as an independent business.

**NorTel** has opened a new \$10 million Asia-Pacific customer support facility in Melbourne. The centre will provide support to NorTel's Australian, New Zealand and Asian customers, and will also be used to test new products and services.



## In Brief

**Energis**, the telecommunications subsidiary of the UK's National Grid, has beaten BT to a BBC programme distribution contract worth £100 million. From the beginning of 1995, Energis will link BBC studios and programme production centres to their television and radio broadcast transmitters, which provide the final link to UK audiences. The contract comes just a few weeks after Energis was granted its national operating licence.

**Swiss PTT Telecom** has become a partner in Unisource Holding (UH), a joint venture of PTT Telecom Netherlands and Swedish Telecom. Swiss PTT will get a one-third stake in UH, and the partners will merge their datacommunications services.

**The United Arab Emirates** is to get the Gulf region's first intercontinental submarine cable, following an agreement between Emirates Telecommunications Corporation and Nynex-led FLAG (Fibre Optic Link Around the Globe).

**Telefonica**, DB Telekom, Belgacom, PTT Telecom, BT, Mercury and Telecom Denmark will build the first European link to use undersea passive erbium optical amplifiers. Part of the link will represent the world's longest unrepeated undersea system. The 1,800km cable will link Santander in Spain with Porthcurno in the UK, Veurne in Belgium, and Alkmaar in the Netherlands.

**Northern Telecom** and China's State Planning Commission have signed a Memorandum of Understanding covering a range of manufacturing, R&D, technical and training projects. The partners will establish joint ventures to produce DMS-100 Supernode switches and very large scale integrated circuits.

**Russia** now has its first C-band satellite communications option for voice and data, provided by IDB Communications Group via an earth station outside London and the Statsionar 5 satellite.

**Belgacom** says it has shortlisted six companies for a joint venture to operate a GSM network from the beginning of 1994. The companies are France Telecom, Cable and Wireless, Bell South, Pacific Telesis, Southwestern Bell and US West.

**Ericsson** and Norwegian Telecom are to co-operate in a Universal Personal Telecommunications Services project. They will test services developed by Ericsson, and say the project will provide market, technological and functional knowledge about UPTS.

**The UK Dept of Trade and Industry** (DTI) has decided to hold back the spectrum released by the 1992 merger of personal communications network licencees Mercury PCN and Unitel until April 1995, citing lack of interest in a third national PCN operator.

**Ericsson Radio Systems** has signed a ¥1,805,000,000 contract with Central Japan Digital Phone Co. for an extension of the digital mobile network that is currently being installed by Ericsson.

**Indonesian** satellite operator, Satelindo, has chosen the Ariane-space European consortium to launch the next generation of Indonesian satellites. Ariane-space beat rival General Dynamics for the contract, and will now concentrate on getting the planned Palapa C-1 satellite launched by October 1995.

**Mercury** says over 30,000 new customers are signing up for its residential service every month, with the total number of residential customers now exceeding 500,000.

**Telecom Denmark** and Great Northern Telegraph Company have signed an agreement with Russia's Intertelecom to build a fibre optic link between Russia, Japan and South Korea, and to provide increased capacity to SE Asia, Oceania and Nth America.

**Russian** demand for telephone products is far outstripping production capacity, with order books for Astra class phones already full until May next year. GPT Moscow City Telephone network joint venture, Comstar, is currently manufacturing between 2,000 and 3,000 telephone sets per month.

**Vietnam** is about to set up a major CT-2 telepoint network. The favourite to win the contract to set up the initial 200 base stations is a Coventry-based unit of the UK's GPT.

**UK** cable operators installed more than 15,000 new telephone exchange lines in April, according to the UK Cable Television Association. The total number of lines installed has risen by almost 50,000 since January, to 156,690.

## EC Compromises on Liberalisation

EC Telecommunications Ministers have opted for a phase-in approach to the liberalisation of voice telephony services, offering a delay of up to five years from the original 1998 deadline for countries with small or underdeveloped networks.

The deal, which was agreed upon by EC Ministers in Luxembourg in June, allows Spain, Ireland, Portugal and Greece to postpone full liberalisation until 2003, to allow time for their telecommunications networks to be upgraded.

A further clause in the agreement will allow countries with small networks, principally Belgium and Luxembourg, another

two years beyond 1998 to prepare for competition.

Danish Telecommunications Minister, Arne Melchior, said the decision did not mean a two-speed Europe, but instead was a realistic approach which took into account the different levels of network development.

The EC also made an undertaking to help the four so-called cohesion countries — Portugal, Spain, Ireland and Greece — by the transfer of know-how from countries where competition is more advanced and by assisting in the re-balancing of tariffs.

No agreement was reached regarding alternative infrastructure being used for voice traffic.

## New Partners for GEN Venture

Belgacom and Telecom Portugal have announced they have joined the Global European Network (GEN) leased lines venture. Other members of GEN are BT, Germany's Deutsche Bundespost Telekom, Spain's Telefonica, Stet/Iritel of Italy and France Telecom.

GEN members say they will build a fibre optic European virtual network, with each operator guaranteeing its customers optical fibre for their leased line networks. GEN customers will also benefit from faster restoration in the event of a network failure, and improved network management and supervision.

## Cable & Wireless Profits Increase

C&W has announced a rise in pre-tax profits of 43%, to £918 million for the 12 months ended March 31, 1993. Turnover rose 22%, to £3,826 million.

C&W subsidiary, Mercury Communications, experienced strong growth in both operating profit (up 24% to £192 million) and turnover (up 31% to £1,199 million). Mercury handled over 11 million calls every working day in March 1993, 37% more than for the same month in 1992.

C&W's Asia-Pacific operations enjoyed an increase in turnover of 20% to £1,071 million, and a rise in operating profits of 16% to £563 million.

## AT&T, KDD to Test ATM Products

AT&T and Japan's KDD were last month scheduled to begin a trans-Pacific technical trial of ATM. The trial will link Shinjuku, Japan with Holmdel in the US, and at 14,500km, will be the longest intercontinental ATM network in operation.

Initially, two 45Mbps links will operate between Holmdel and Shinjuku. AT&T's GCNS-2000 ATM switches will be the switching platform for the trial, which will also be used to as-

sess other switches for interoperability. A KDD ATM evaluation platform, the Libra-II, will measure performance.

AT&T and KDD are working together to jointly develop models to predict performance over extremely long distances, and said these models will be combined with the trial results to develop optimum service architectures and network engineering tools for future global ATM services.





*Stock markets go up and down, but your network can't. That's why LANNET designed MultiNet™ - intelligent hubs with*

## THE MARKET IS UP. UH-OH! *Our network is down*



© 1993 MULTINET, MULTIMAN AND LANSWITCH ARE TRADEMARKS OF LANNET DATA COMMUNICATIONS LTD.

*blue-chip reliability. Robust design includes port, segment, and power redundancy with no single point of failure.*

**FAULT TOLERANCE** *Failsafe - and flexible. Monitored modules bring multiple-network, multisegment Ethernet, Token Ring, FDDI, LocalTalk, and RS-232 into one hub, with integral bridging and routing. The MultiMan™ SNMP management system provides powerful centralized analysis tools.*

*Protect your networking futures. MultiNet hubs incorporate LANNET's LANswitch™, an ATM-ready 1.28 Gbps backplane, delivering bandwidth for full-motion video and workgrouping over today's 10BaseT networks. If you're looking for a secure investment with high dividends, it pays to call LANNET. We're one market that won't let you down.*



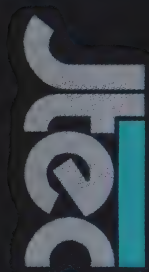
THE FAILSAFE FUTURE OF NETWORKING

INT'L. HEADQUARTERS: TEL 972-3-6458458/ FAX 972-3-5447146

U.S. HEADQUARTERS: TEL (714) 891-5580/ FAX (714) 891-7788

FRANCE: TEL 33 1 69 85 24 11/ FAX 33 1 60 19 29 54





# Solutions



## Mission Critical

*...a statement that sums up the telecommunications requirements of Australian Airlines for services such as Telephony and Data Communications.*

**If this sums up your business requirements then choose the Networking options that the experts choose...**



Telecommunications Solutions applied with business sense

### Head Office

Jtec Pty Limited  
ACN 003 169 088  
Unit 3  
118 - 122 Bowden St  
Meadowbank 2114  
NSW Australia

### Phone

International 612-809-6933  
Sydney 02-809-6933  
Melbourne 03-263-0200  
Brisbane 07-229-9137  
Canberra 06-256-3480  
Europe 35-321-277-422

### Fax

International 612-809-6619  
Sydney 02-809-6619  
Melbourne 03-263-0215  
Brisbane 07-221-6625  
Canberra 06-201-3003  
Europe 35-321-270-420



# The Ballot Beauty Contest Begins

The Telecom-Optus advertising war heats up as the Canberra and Sydney preselection ballots get underway.

In early June it seemed that the last hurdle to the preselection ballot had been surmounted. After months of difficult negotiations between the two carriers and two arbitrations by Austel the way seemed clear. But it wasn't.

Austel arbitrated at the end of May to resolve differences between the carriers on their jointly-funded public education campaign. Austel concluded that the campaign would not encourage people to vote, but would confine itself to raising their awareness of the ballot and the issues behind it. This clearly did not suit Optus because all non-voting users stay with Telecom. Optus therefore came up with a scheme to induce people to vote, by offering to enter names into a draw, initially for holidays and expensive motor cars and later offering a total of 40 prizes of \$10,000 each.

Telecom objected strongly to the whole scheme, and claimed it could not be implemented because Telecom employees would not be eligible to enter the prize draw and Telecom, of course, was not about to divulge details of its workforce to Optus.

At the time this issue of *Australian Communications* went to press, no agreement on a joint incentive scheme had been reached, none seemed likely and Austel was leaving both carriers to go their own way, with a proviso that it would block anything which it felt compromised the integrity of the ballot which Optus had decided would start in Canberra on July 15 and in Sydney on August 3.

Meanwhile both sides started to mobilise their own workforces to spread the word.

Telecom has a 500-strong National Communications Team made up of Telecom staff who volunteer to talk to community groups and others on telecommunications topics. This body has been co-opted to address such bodies on ballot issues and at the same time, gather intelligence about community attitudes to the process.

Not to be outdone, Optus created its own team of volunteer staff speakers under Community Co-ordinator, Maggie Ramsay, to go out and spread the word about the ballot ('even handedly' according to its press release). Optus took a proactive approach by writing to over 300 community groups offering speakers.

Telecom's bid to hang on to market share in the first ballot in the ACT 06 call zone gained an additional ally in the form of the Public Sector Union which announced at the end of June that its members would actively



campaign for Telecom in the Canberra ballot. The same union had just resolved an industrial dispute with Telecom which threatened to severely tarnish Telecom's public image on the eve of that ballot.

In addition, both carriers are now mustering armies of celebrities to champion their cause: Actors, past and present sports personalities and, in Optus' case, the entire on-air staff of Sydney's top rating AM radio station, 2UE.

## The Big Prize: Government

By choosing the ACT as the first local call area to suffer the preselection ballot Optus has picked the smallest and perhaps most manageable of the initial zones, but also the one which is least representative of the country as a whole. The 06 call area has about 250,000 lines and it is estimated that 35 to 40% are installed in Government departments.

The Federal Government has been the subject of some very concerted marketing activity by Telecom and AAP Telecommunications (AAPT) and many Government departments are locked in to long-term ar-

rangements with Telecom, or have signed up for AAPT's Onegovernment service.

AAPT has already signed up nine Government departments for its Onegovernment service. These include, Treasury, The Department of Finance, Commonwealth Funds Management, the Director of Public Prosecutions, the National Gallery of Australia, the Australian Taxation Office, the Department of Defence and the Governor General's Residence.

So far Optus' only significant customers in Canberra are believed to be those inherited from Aussat: The Australian Customs Service, the Australian Federal Police and the Department of Defence.

Telecom launched its Fednet scheme in 1991. Under this scheme individual government departments use CustomNet Horizon and are treated for billing purposes as one customer, thereby maximising volume discounts. There was no formal agreement initially and the scheme attracted a good deal of criticism because organisations which were not true government departments were said to have been included, for example the Australian National University.



## Telecom's Advertising: From Sinner to Saint?

Whatever the outcome of the Canberra and Sydney preselection ballots, it will be privately celebrated or mourned because Telecom and Optus have agreed that it is in neither of their interests to make the results public.

But to Telecom's advantage, the most optimistic projection last month was that only around 50% of the ACT's 150,000 subscribers would bother to vote, with those who didn't automatically staying with Telecom. Apathy could turn out to be Telecom's best ally.

In such a situation, Optus has every reason to be trying to whip up a little consumer excitement by offering 40 \$10,000 cash prizes to those who return their votes to consultants Price Waterhouse Urwick in the Canberra, Sydney and Melbourne ballots. Even subscribers who vote for Telecom will still be in the running for the Optus prizes.

Price Waterhouse's Ballot Administration Hotline Manager David Hogan says subscribers will have 30 days from the start of each ballot to cast their votes. He says he would be "very surprised" if the actual numbers and preferences of voters ever saw the light of day.

"If the result heavily favoured one side, then that side might be tempted to gain some publicity from it, but then any protest by the other side would lead to arbitration by Austel, so there wouldn't be much point," Hogan says.

Probably the biggest winners from the ballot are the advertising agencies such as George Patterson, DDB Needham, Mojo and John Singleton, which are involved in the \$150-\$200 million marketing battle.

Austel Member, Johanna Plante, says subscribers possibly should be told the results of the ballots, but the actual raw numbers would not necessarily indicate how much of the market Optus was gaining. "STD and IDD calls generate the most income and some 30% of subscribers don't ever call long distance, so you would really have to break down the vote in greater detail," Plante says.

While Optus dangles the cash carrot and features celebrities in its television campaign, Telecom's response has been to completely reject prizes and, instead, promote itself as a 100% Australian company that can offer a complete telephone service to households.

"We refuse to make a circus of the ballot," says Telecom's Director of Corporate Marketing, Charlie Zoi. "Also, we don't have the kind of money to throw around that BellSouth and Cable & Wireless do." Zoi revealed that in the wake of the false advertising claims and being for-

ced to run full-page corrections, Telecom has now centralised the system for approving all media advertising from the various business units "because the old system clearly didn't work."

"We made some errors and we want to ensure that they never happen again, now that we understand the rules," he says. Rejecting suggestions from Trade Practices Commission head, Professor Alan Fels, that the false claims were part of a "systematic failure to control advertising" and that Telecom's advertising procedures had gotten "out of control," Zoi said it was a simple case of "humans making errors."

While the business units will still retain their own media advertising teams, all advertisements would be checked by his office. "We now have a funnel through which all advertising must pass for approval. Our legal people will also be involved so that the law as we understand it will be obeyed," Zoi says.

Zoi says all 70,000 Telecom staff, from CEO Frank Blount down, felt embarrassed by the claims of false advertising. "My personal integrity was impugned and I didn't like it. Nobody did," he says.

But it appears that Telecom will not be taking up a TPC offer to stage a compliance program for Telecom staff. "The TPC visited the Melbourne offices in December last year and laid out their expectations, and there was another compliance course in May, so now we feel we can police ourselves," Zoi says.

A spokesman for Optus, which has had just one run-in with the Trade Practices Commission compared with Telecom's seven in 12 months, told *Australian Communications* a letter had been sent to Zoi pointing out the errors in the Telecom advertisements, but it took the TPC to step in before anything was done.

The spokesman said Optus' marketing, legal and customer service representatives would continue to monitor Telecom's advertising campaigns, as well as following up on tips from customers.

Trade Practices Commission officer, Robert Southern, said Telecom had given him a list of names of staff responsible for approving advertisements in the various business units.

"Telecom is obviously having a very serious look at this situation and is to be congratulated for the speed with which it published the TPC corrections and the duration for which they were run," Southern maintains. "With this sort of reaction, there's little doubt that some Telecom staff had their ears chewed."

**Bernard Levy**

In May last year Telecom signed a Heads of Agreement with the Department of Finance to formalise the agreement and clarify what bodies could participate. At that time about 90 Government PABXs were operating on CustomNet Horizon.

Rather belatedly, only three weeks before the July 15 start date for the ballot, Optus introduced its own discount scheme designed to secure government business. Optus' Federal Government Advantage scheme differs from AAPT's and Telecom's strategies for locking in Government users in that it does not require any formal agreement with a participating user.

Optus has a discount scheme, Optus Advantage, which gives large users a discount on their monthly bill in proportion to usage and Optus has applied this to the Federal Government, after discussions with the Department of Finance's Telecommunications Policy Advisory Unit, so that the discount is calculated on the total monthly bill of all eligible departments. Each receives the resulting percentage discount applied to its individual bills without having to sign up in any way. The maximum discount is 20% where expenditure is in excess of \$1 million per month.

### Three Preferred Options

In the Canberra ballot, Federal Government departments will be able to make decisions affecting their operations throughout Australia. The Government's Information Exchange Steering Committee (IESC) has prepared a three page guide to the ballot for Government departments. It instructs those departments which wish to make an Australia-wide decision at the time of the Canberra ballot to contact the ballot administrator, Price Waterhouse. The document gives them three options:

- Government agencies with locations across more than one dial code area may write a letter of authorisation (LOA) to the ballot administrator, notifying their preferred carrier either on a line by line basis, in groups of exchange lines, or corporately. This LOA may cover all locations within the organisation. However, as each call zone is balloted the agency will be provided with a list of its lines in that call zone, so that it can change its original request. IESC Chairman, Pat Barrett says in the guidelines that 'This LOA option appears to be a reasonable compromise for the Commonwealth and least disruptive and I encourage you to consider adopting this approach.'
- Agencies with multiple locations within the same call zone will be able to customise their ballot forms (i.e. decide where decisions on carrier choice are to be made) prior to the ballot by informing the ballot administrator of their preferences.

*Continued on page 31*



## New Zealand

## New Zealand's TDMA Tangle

BellSouth New Zealand, Telecom Corporation of New Zealand and the Ministry of Commerce issued a terse joint media release on June 18 confirming interference between the two cellular networks. The release was issued only days after all three parties denied any inter-network interference.

Significantly, all three parties emphasised that the problems, while real enough, are not serious. It is highly unlikely that everyday users will even be aware of any interference. Indeed, all three said they are confident that both systems will work with each other.

Currently in New Zealand, BellSouth operates a GSM service, while TCNZ operates analogue and Digital AMPS networks. A third carrier, Telstra, plans a GSM service.

It appears there are at least two and possibly three separate interference issues: band separation, physical location of cellular sites and reception problems with TCNZ's AMPS handsets. First is the issue of band separation between the two services. Like Australia, Thailand, Hong Kong and Singapore, New Zealand operates cellular services on both the North American and the European frequency bands.

In simple terms, under the New Zealand model, the North American cellular frequencies stretch from 825MHz to 890MHz, while the European frequencies range from 890MHz to 960MHz. TCNZ effectively owns the cellular spectrum management rights from 825MHz through to 890MHz. This is the AMPS band. At present this is by far the largest slice of suitable frequencies for cellular operators. TCNZ's Telecom Cellular subsidiary operates both analogue and digital cellular services in this band. A section of frequencies in the middle of the AMPS band is set aside for pagers and other services.

BellSouth tendered and won the first two slices of the higher European frequencies. It chose to take up management rights to the lower frequency or TACS-A band. In hindsight this was not a smart move. Telstra now has the rights in the TACS-B band. At present the TACS-C band is largely unused. In the New Zealand model, TACS-A stretches from 890MHz to 898.5MHz.

### Where Europe and the US Meet

At the root of the problem is the area where TACS-A meets AMPS at 890MHz. TCNZ's AMPS network uses the section of spectrum just below 890MHz for its base station transmit band. BellSouth's GSM network uses the slice of spectrum just above 890MHz for mobile transmit or base station receive. Base stations transmit at relatively higher power levels and are geared to receive relatively

weaker signals. Technically, this means that transmitting base stations may overload base receive in the next band. This is exactly what appears to be happening.

To head off this problem, BellSouth and TCNZ negotiated a 0.9MHz guard band at 890MHz. The guard band is an unused section of frequencies designed to act as a barrier or buffer between the two allocated frequency bands. In addition, BellSouth uses some of its frequency allocation as a further guard band. However, it appears the guard band may not be wide enough. In Hong Kong the guard band at 890MHz is now 1.8MHz wide, though it was originally set at 4MHz. TCNZ said during the negotiations, it recommended a far wider band than 0.9MHz.

One possible reason for the interference lies in the physical location and organisation of the two networks' base stations. Base station filtering is an issue; apparently both networks are improving their filtering.

But the geography of Auckland turns out to be a major problem. Auckland is New Zealand's major city and most important commercial centre. Almost one third of New Zealanders live there. Currently TCNZ operates around 60 cellular sites in the Auckland area and certain frequencies are reused up to seven times. The city's hilly geography makes it hard for BellSouth to locate its cellular sites in such a way that its base stations can cover all the important districts without picking up transmit signals from TCNZ's existing cell sites.

BellSouth, TCNZ and the Commerce Ministry are working together to solve this problem. Though none of the parties concerned are prepared to talk about details, it looks as if BellSouth will 'borrow' some further frequencies in the as yet, largely unused TACS-C band pending a long term solution.

Though the problems of cellular sites and interference between the two networks is a concern, it may not be the most serious issue. It appears that phones designed to work with TCNZ's AMPS network are particularly vulnerable to 'out-of-band' frequencies. Again, this problem is a consequence of New Zealand cellular operators using both the US and European cellular frequencies.

In particular, AMPS phones are said to pick up signals generated by BellSouth's GSM network. With tens of thousands of phones already in circulation, there are no quick fixes for this problem.

In most cases, some users of TCNZ's analogue services will simply experience increased noise on their phones. If they notice anything at all — a big if — Digital AMPS callers will experience occasions when their telephones appear to go dead. The absolute levels of the interference are not expected to be very high to start with, but as BellSouth and other GSM operators increase their call volumes, it may increase.

**Bill Bennett**

# NEWS

In this fast changing industry you need publications that bring you the news as it happens. Publications written for the telecommunications professional, not the general business reader. Publications that give you only the news: concisely, readably, accurately, and objectively.

Those publications are *Exchange*, the leading news weekly for the Australian telecommunications industry and *Telenews Asia*, our new fortnightly newsletter covering telecommunications from India to the Pacific.

**For free samples, fax your name and address to:**

**(02) 818 2294**

INT: +61 2 818 2294

**Or call us on:**

**(02) 555 7377**

INT: +61 2 555 7377

## Exchange

SHOULDN'T YOU BE READING THEM?

## TELENEWS Asia



## Infrastructure

## Will Telecom Make the Switch?

Less than three years after awarding Alcatel Australia a contract to supply urban and rural switches for its public network, Telecom is again out to tender and the indications are that at least one of the three incumbent suppliers — Alcatel, Ericsson and Northern Telecom — will be dropped.

The move marks a sharp turnaround in Telecom policy. When the Alcatel deal was announced in November 1990, Telecom awarded Alcatel an initial contract worth \$72 million and said it would install 110,000 lines in 1991/92 and increasing quantities in the following two years.

That decision was announced only three weeks after the Government decided that Telecom and OTC would be merged and that full scale competition would be introduced. Possibly much of the decision making for the

Alcatel win would have been made without taking into account such a scenario, and also possibly without the impact of the decision on Telecom's choice of switching technology being apparent.

Now that competition from Optus is very much a reality, the priorities are very different. Telecom has just completed a major study into its 'Future Mode of Operation' and has concluded that it must, within three years, create a network that can meet or better that of Optus, which has the advantage of starting from scratch and being able to use state-of-the-art technology to create a homogeneous network.

The criterion on which this is being judged is the network's ability to support an increasing range of intelligent network services, and for those services to be able to be created and introduced quickly when an opportunity is identified or in response to an initiative from the competitor.

Accordingly, all three suppliers have been asked to re-tender and, according to Doug Campbell, Group Managing Director Networks and Technology: "We have to

decide whether we want two of the three, one of the three, or whether we need to look further afield."

Note that three of the three is not an option under consideration. Apart from getting the right network, Telecom has a wider agenda: to reduce the number of suppliers it deals with.

A similar rationalisation is also underway among the suppliers of transmission technology. Last year Telecom selected four suppliers of SDH transmission technology: Alcatel, NEC, Philips and Siemens. It has asked all four to retender with the intention that only two will remain.

The same philosophy is being applied to every aspect of Telecom purchasing. Telecom presently deals with somewhere between 12,000 and 20,000 suppliers and intends to greatly reduce this number. It may still source goods and services from the same range of suppliers, but intends that smaller ones will be handled as subcontractors to its major suppliers.

*Stuart Corner is the Editor of Exchange.*

## Exports

## Olex Focuses on the Asian Market

Olex Cables is planning to build more manufacturing plant in Asia as it increasingly looks to the export market to top up domestic revenues. Such investments should help boost the company's exports by 20% per annum over the next few years, says Ian Campbell, Managing Director of Pacific Dunlop's Cables Group, which includes Olex.

The extra revenue would boost an already impressive \$500 million annual turnover for the Cables Group, which also includes Burton Cables in Melbourne, Spinaway Cables in Sydney and Olex New Zealand in New Plymouth.

Campbell says Olex is now "seriously considering establishing a plant in Indonesia, which would give Olex some access to the Islamic world of the Middle East. Discussions are well advanced. By comparison with Asia, Australian labour costs are high. But in a capital-intensive environment labour costs are not the reason for expanding into Asia," Campbell says. "It's more a matter of establishing a good relationship with the local purchasers."

In its latest export contract, worth \$70 million, Olex is installing 3,150 kilometres of optical fibre that will link the cities of Lanzhou, Urumqi and Yining in north western China. Financed with funds from the Australian International Development Assistance Bureau and the Export Finance and Insurance Corporation, the project is being

undertaken in consortium with NEC which is supplying the transmission and multiplex system, including protection switching and a network management system for remote surveillance and performance monitoring.

The latest contract follows one worth \$30 million linking the cities of Chengdu, Xian and Zhenhou which was won last year in the face of fierce international competition.

Olex is also negotiating another four contracts worth a total of between \$60-\$70 million with China's Ministry of Posts and Telecommunications, which oversees new communications infrastructure development for the country's regional authorities.

In addition, the company is negotiating a range of smaller cash contracts worth between \$2-\$4 million, which are separate from any major contracts involving Telstra.

Olex has sold cable into Sri Lanka and is understood to be negotiating with the Government there. Talks are also continuing with the Indian Oil Corporation and a local subcontractor for three pipeline contracts worth between \$20-\$40 million. Meanwhile, a \$3 million deal with Telecom Malaysia has recently been fulfilled.

Campbell says that while Olex is happy to ride on Telstra's successes in Asia, (for example, laying the 2,100km optical fibre cable linking 12 cities in Pakistan which was started in 1991), the company was increasingly seeking out its own markets. "We are selling more optical fibre cable on cash contracts, not just supplying to turnkey projects like Pakistan," Campbell says.

A role model for Australian companies wanting to move into Asian markets, Olex has been relationship building and consolidating its position in China for six years.

"Our future lies in the Asian market. We have no designs on either Europe or the US," says Campbell. "The Asian markets are generally protected and you must have a plant in the country otherwise import duties are prohibitive."

The building blocks for the China relationship are Olex's plants at Shenzhen and Tianjin, constructed for a total cost of \$50 million, which produce twisted pair cables to run off the long distance optical fibre backbones being installed by Olex with cable from its Tottenham plant in Melbourne. Both Chinese plants are now reported to be running at a profit.

Employing a total of around 600 people, the Tottenham plant serves as company headquarters and was upgraded at a cost of \$5 million earlier this year in preparation for the new China projects.

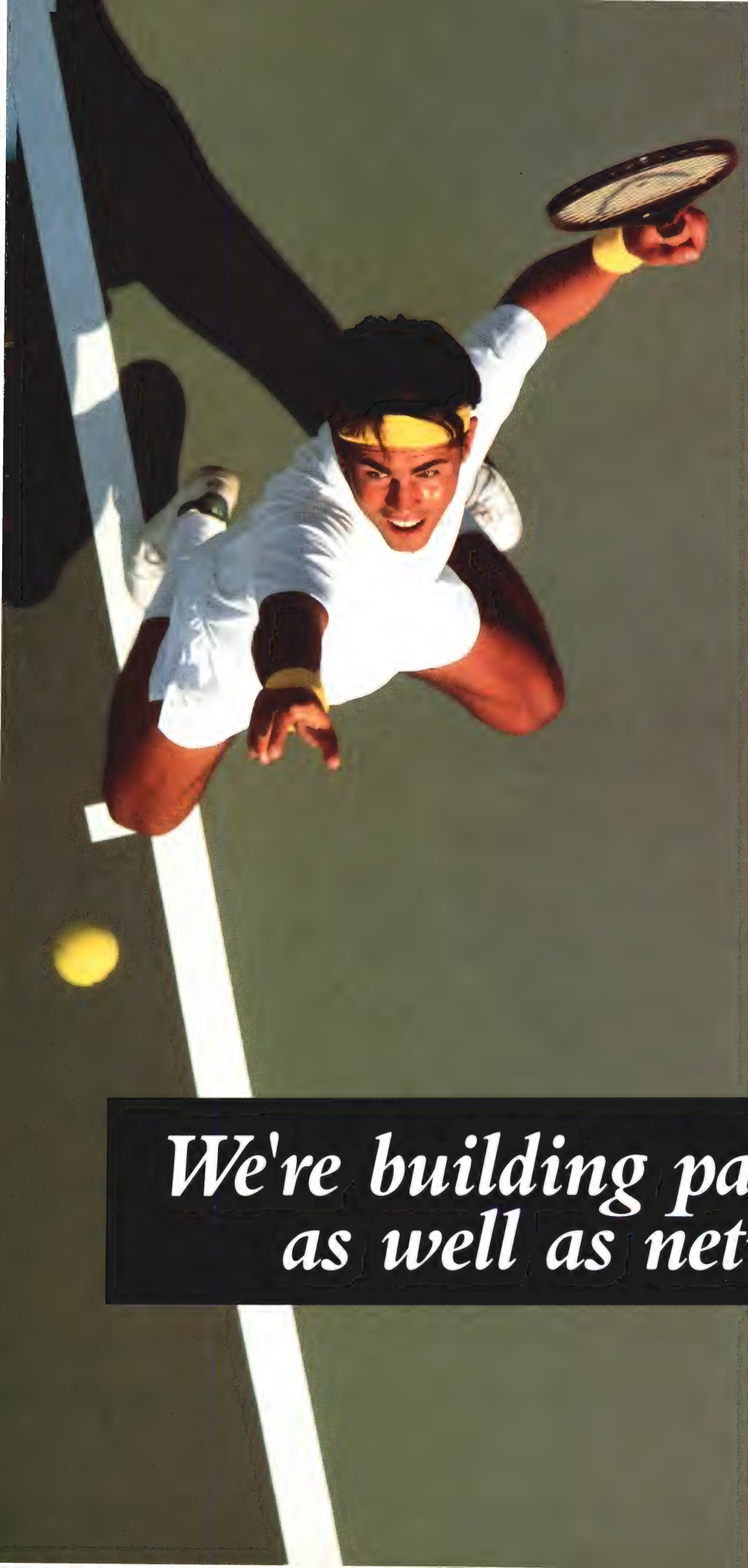
Campbell says Olex plans to upgrade the Tianjin plant to produce optical fibre cable later this year.

"But the Tianjin cable will be suitable for distribution networks, not for major trunk routes like the one we're installing now," Campbell says. "The higher quality cable will continue to come out of Tottenham."

While Campbell rates Olex Cables at about equal in size to its major local rival, Metal Manufactures in Melbourne, but larger than Pirelli in Sydney, he notes that Pacific Dunlop is totally Australian-owned and profits from Asia and New Zealand are expatriated to Australian shareholders rather than to a foreign parent. "Institutional investors like the AMP have a substantial stake in Pacific Dunlop, but a large percentage of our stock is owned by smaller shareholders."

**Bernard Levy**





***“ We can sell the Tennis Centre (16,000 capacity) in about 20 minutes. ”***

*Manager Information Systems  
Bass Victoria Ticketing*

Making the business of the box office run smoothly across the State of Victoria is what JNA is achieving for Bass Ticketing.

JNA Network Services gets to know your business first, and your business goals, before extending the network. The technical expertise follows. And that is considerable.

For over 30 years we have implemented complex inter-networking solutions for banks, retail chains and government, city-to-city, building-to-building, floor-to-floor. And we get it right.

So see us first. It is quite likely you need more than a network integrator; you need a business partner. Call us now on: Sydney (02) 417 6177; Canberra (06) 273 5044; Melbourne (03) 532 8555; Brisbane (07) 870 3434.

***We're building partnerships  
as well as networks.***

**JNA** Network  
Services  
*Innovators in Business Connectivity*



## United Kingdom

## New Options For UK Net Managers

Until recently, companies looking to implement corporate data networks in the United Kingdom faced a classic Hobson's choice: they could build and operate their own backbones using private lines or they could do without. Value-added networks — the so-called alternative — just didn't offer enough bandwidth, deliver the necessary level of user control, support the requisite protocols, or cover sufficient territory.

To make matters worse, UK customers were almost as constrained when it came to leasing those lines. They could go with BT or Mercury Communications. But Mercury relies on BT circuits for much of its access, so there wasn't much room to drive down prices by playing one against another.

Over the past year, though, network managers have had a chance to reap the benefits of an unshackled — if not totally free — market. The UK Government has allowed cable TV operators and purveyors of radio-based networks to offer telecommunications services, thus bypassing BT's access lines. And during the same period, new networking services such as frame relay have started to arrive. These support bandwidths up to 2Mbps and furnish some of the features of private data networks, such as end-to-end management and fixed monthly costs.

Over the next 12 months, further developments can be expected. New carriers will be licensed, including a direct competitor to BT and Mercury, Energis Communications. What's more, even higher bandwidth services such as Switched Multimegabit Data Service (SMDS) will launch. And now that BT is asking to be licensed as a public carrier in the US, it's coming under pressure to offer US carriers — most notably AT&T and Sprint — equivalent access to UK markets.

Without a doubt, there are big changes in store for the UK telecom industry. But it

remains to be seen what, if anything, corporate customers will do with their newfound freedom. In a survey of network managers at 100 large UK companies undertaken last year for US network equipment vendor 3Com, only 13% named frame relay as a core technology for coming networks. Six percent named ATM (asynchronous transfer mode), while a mere 2% went with SMDS. ISDN got the highest score, with 22%. (All of the companies canvassed had more than 500 employees; 20% had more than 500 employees; 20% had more than 10,000).

"It's clear that most companies are still planning to use low speed networks, meaning that few will be making radical backbone changes," 3Com concludes in its survey report. But that conclusion may not be as definitive as the figures first suggest.

Only 24% of the companies surveyed said they have a strategic plan for network development. And only 5% said their plans stretched further ahead than a single year.

Forecasts from Intelidata also suggest that high-bandwidth services may meet with low demand. By analysing PTT projections for sales of all data services and comparing them with forecasts for data termination equipment, the market research firm was able to extrapolate the projected growth for different business segments, according to bandwidth. The biggest change will be in companies upgrading from 9.6Kbps to 64Kbps. Intelidata expects basic-rate interface (BRI) ISDN to account for 444,000 network termination points by 1998, up from 2,500 in 1992.

The firm also expects the number of 64Kbps leased lines to more than double over the same period. What it doesn't expect to see is much activity in 2Mbps leased lines, and the market researcher indicates that network terminations of leased lines above 2Mbps will only reach 8,160 by 1998, a tiny proportion of the UK's overall market.

Here again, though, the gloomy predictions for high-bandwidth services may be a bit premature. Most likely, Intelidata's projections do not take into account the changing telecom environment. If prices plummet, it's

far less likely that customers will be tempted to give high speed LAN interconnect the cold shoulder.

## Frame Relay

Users are just starting to take an interest in domestic frame relay, says BT. Mercury has launched a trial service with a single, unidentified customer but says it won't promote the offering until it has more experience. Other operators have a single POP (point of presence) in the UK and are focusing chiefly on international services, particularly for US corporations.

BT already has two domestic customers, according to Nick Brooks, UK product manager for its Global Network Service LAN Interconnect Services. He indicates that BT has 40 frame relay customers worldwide and is "swamped" with orders for international connections. The service, which is available in 40 cities, is being upgraded from 64Kbps to 2Mbps. BT also plans on introducing dial-up frame relay, along with a gateway to X.25 networks. Both strategies are intended to make frame relay attractive to customers at remote sites, delivering low-speed access to places not yet reached by BT's network. The carrier notes that it will add ISDN back-up to its frame relay access lines, thus boosting reliability.

France Telecom Network Services, a subsidiary of France's public X.25 network operator Transpac SA, plans to offer frame relay over the X.25 network it's rolling out in the UK. The X.25 installation is already being used for virtual private data networks (VPDNs) and has POPs within a local-call distance of 65% of the UK says Mike Brockington, the company's director of technical operations. "We hope to have 95% coverage by the end of the year," he adds.

Brockington says all services launched in France by Transpac will be rolled out in the UK six to 12 months later. These include X.25 private virtual circuits operating at 256Kbps (an upgrade to 2Mbps is already being discussed) and a terminal adaptor with a frame relay interface, which will enable routers to work far faster than if they were



*Networking  
by Dataplex*

Call us,  
We'll send the brochure  
(03) 210 3333 (02) 349 3911 (06) 285 3657

Local, Wide Area and Switched Networks

**Dataplex**



*We've got your number.*



Category 5 is the direction of choice for future-proofing your network. And now you have the best-and easiest- way available to get there, with a full choice of Category 5 connectivity solutions from AMP.

Our Category 5 offerings are fully developed and integrated, extending technologies we pioneered years back. In fact, if you're already using your AMP Communications Outlet system and have Level 5 wiring in place, you can upgrade to full Category 5 by simply changing inserts-without touching your wiring in the closet or at the workstation-and inserts are available now. AMP Communications Outlets and patch panel systems provide a high-level, modular approach to premises wiring, simplifying adds, moves, changes, and upgrades to a fast, easy insert change.

If you prefer a traditional, hard-wired approach, AMP Category 5 110Connect patch panels and outlets offer the performance you're looking for, with the ease and convenience of punch-down termination.

AMP Category 5 products have been tested by Underwriters Laboratories Inc. and have been verified to comply with the applicable requirements of TIA/EIA TSB40.

If you need a total solution, contact your local AMP NETCONNECT Division



AUSTRALIAN AMP PTY LIMITED  
Phone: (02) 680 3377  
Fax: (02) 643 6188

NEW ZEALAND AMP LTD  
Phone: (09) 634 4580  
Fax: (02) 634 4586

AMP and NETCONNECT are trademarks.

**THIS IS AMP TODAY.**

**AMP**



attached directly to X.25. Brockington comments that these services will first be offered separately in France and the UK, and then connected. They will later be extended to other European countries.

## IP Services

While BT and France Telecom focus on frame relay and fast X.25, other operators are rolling out alternative interconnect schemes, particularly IP services for router networks.

These actually take two forms. Some service providers are looking to build VPDNs as alternatives to private networks. Others are in the business of establishing links to the Internet and thus delivering access to e-mail, file transfer, and tens of thousands of host computers.

Infonet belongs to the first group of providers; its Infolan service supports data rates up to 2Mbps, but is mainly intended for international links and has only a single POP in the UK. Another IP service scheduled to be rolled out in coming months will come courtesy of a collaboration between Cherni-keef Telecommunications, a UK distributor of routers made by Cisco Systems and ANS Co+RE Systems. The latter, a subsidiary of IBM and MCI Communications, furnishes IP transport services over a 45Mbps backbone in the UK.

Among the companies offering connections to the Internet are EUNET GB, owned by the University of Kent, and Unipalm, a Unix systems vendor. The latter's service is called Pipex. Both companies say their offerings also can be used to implement private data networks, but neither delivers the level of end-to-end management that VPDN users are looking for. The two companies have a limited number of POPs, all of which are clustered within 100 miles of London. Since Unipalm charges a fixed price for its service, which includes the fee for an access line, customers aren't penalised because of location. Pipex has been up and running for a year and has nearly 100 subscribers.

## Bandwidth on Demand

BT and Mercury are also involved in services that are intended as alternatives to leased lines, particularly bandwidth-on demand products for time-sensitive traffic line voice and videoconferencing. BT has launched its Flexible Bandwidth Service, which gives customers managed network services over a shared backbone built with multiplexers from Newbridge Networks. Customers can link multiple sites via a virtual network and request up to 1.92Mbps on each connection at three hours' notice. Thus, subscribers don't pay for bandwidth they're not using and can order extra bandwidth to meet peak demands. BT is guaranteeing uptimes greater than 99.85%, even when measured over short intervals.

The carrier already offers nationwide coverage, with nine POPs in major cities,

and has published a list of charges. Still, BT says that it won't promote the service until its engineers have been trained to support it and it has gained experience with early customers. At press time, it had two customers: one of BT's own divisions and an unidentified major retail chain. "We're not looking for enormous numbers," says Kevin Gooding, BT's Marketing Manager for Flexible Bandwidth Services. "It's essential we get the service right from the beginning."

Mercury has come up with Switchband, a switched digital service that lets users dial up bandwidth (from 64Kbps to 1.92Mbps). Switchband amounts to a superset of ISDN, with channel aggregation handled on the network rather than at customer sites. It's tied to similar networks in other countries as part of Mercury's Globand international service.

Both carriers also offer primary-rate interface (PRI) ISDN: Mercury plans to match BT's BRI ISDN offering by the end of the year. And both intend to upgrade their PRI offerings to meet European standards, which will be introduced as pilot services by the end of 1993.

## Introducing SMDS

Although corporate users in the UK have expressed very little interest in high speed LAN interconnect — at least to date — BT is participating in a project that could help it roll out SMDS on a nationwide basis as early as the first quarter of 1994. The project, called Superjanet, also gives BT a chance to experiment with other new public network technologies like 155Mbps Synchronous Digital Hierarchy (SDH) circuits and ATM.

Superjanet will be the UK's next-generation academic research network, linking about 200 universities, schools, and research centres. BT won a contract last November to supply some of Superjanet's key components over the next four years.

In the first phase of the project, now underway, BT is scheduled to deliver a backbone that will link 16 sites via 140Mbps circuits, divided into four 34Mbps subchannels. One subchannel on each route will be used to offload IP traffic now running on the 2Mbps X.25 network, which has grown very crowded; the others will be used for ATM trials. Late this year, BT is scheduled to start replacing the 34Mbps subchannels with 155Mbps SDH circuits. BT's contract also calls for it to supply 10Mbps SMDS links to the Superjanet backbone. Pilot SMDS service is slated to go into operation at 29 or more sites by November, with full service to 45 or more sites expected by early 1994. BT is working with Superjanet's planners to determine how the service could be upgraded to ATM.

Mercury, which was one of the four other bidders for the project, is now considering shelving SMDS plans and moving directly to ATM trials by the end of the year.

**Peter Heywood**

## Industry Development

# A New Lease of Life For the IDAs

Local suppliers of customer premises equipment (CPE) have adopted a cautious, wait-and-see attitude towards the extension of the Federal Government's Industry Development Arrangements (IDAs) for another three years. All eyes will be watching to see exactly who wins exemptions from the existing scheme and on what basis the exemptions have been granted by the Department of Industry, Technology and Regional Development (DITARD) and the Department of Transport and Communications (DOTAC).

Many of the 30-odd companies which responded to a consultative draft from DITARD/DOTAC agree the continuation of the scheme until June 30, 1996 provides a necessary shield against a flood of cheap CPE into Australia. But some players believe there should be even tougher import barriers.

One source, who requested anonymity, says Australia has the opportunity to use its telecommunications infrastructure to develop an effective export-oriented industry. But the local industry needs more real protection at this early stage to give it time to consolidate, the source says.

"The extension of the IDAs is only interim support and Australia, as the only country being 'pure' about the trading game, is acting very naively compared with countries like Japan and Korea. Unfortunately, the bureaucrats are isolated from the real world. They tend to live in their own theoretical and ideological world."

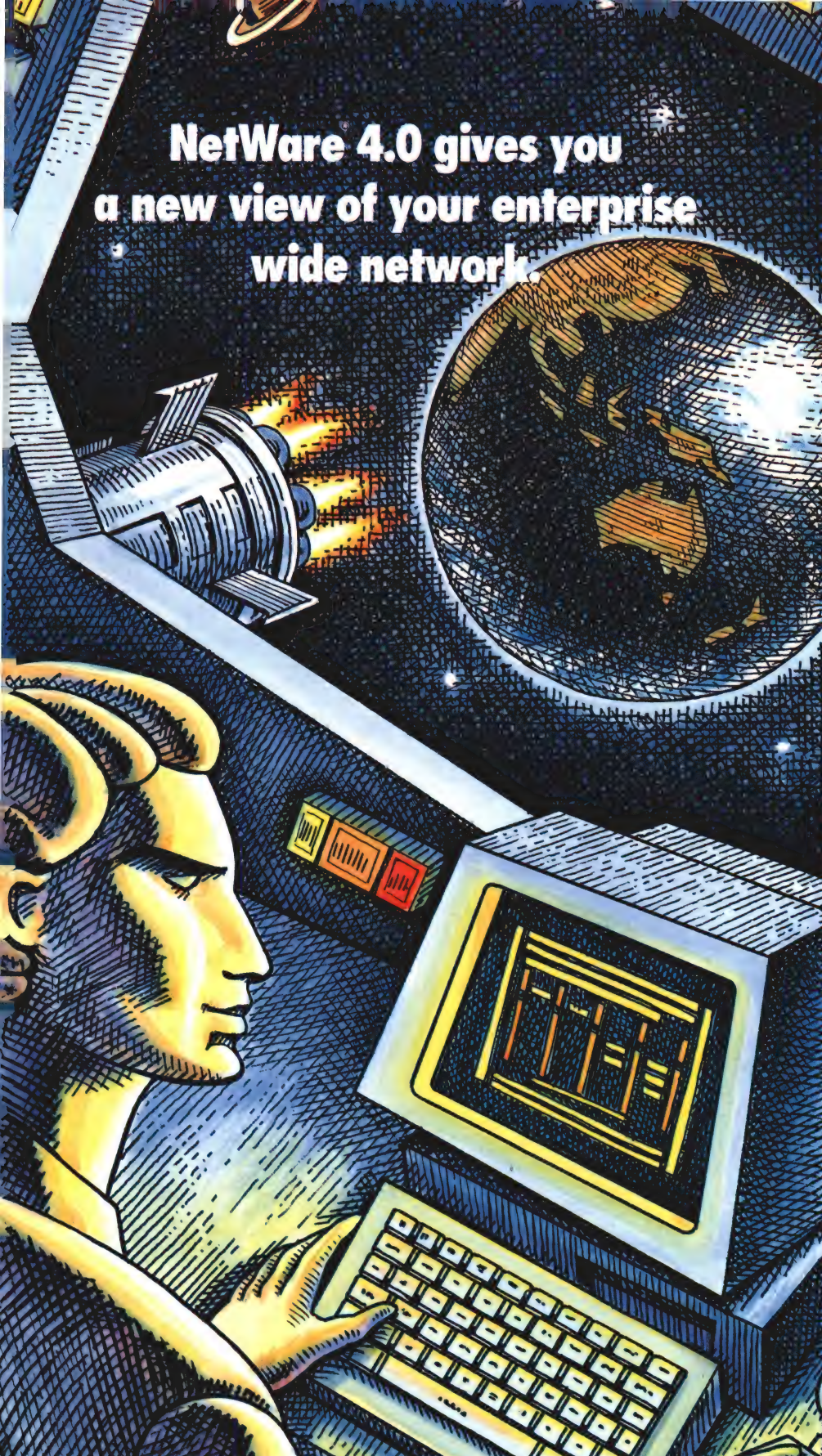
## Exemptions on Offer

The changes to the IDAs mean that companies can now win exemptions from R&D, export and local content requirements, on a case-by-case basis, and transfer to other programs like the Fixed Term Arrangements (FTA) and the Partnership For Development Program (PDP). The FTA is open to companies with sales to government of between \$10-40 million, while the PDP is aimed at companies with government sales of over \$40 million.

DITARD's Assistant Secretary, Information and Technology Branch, John Grant, says the IDA extension will give industry the support it needs to get up to world standards in four specific CPE product areas — first or standard telephones, PABXs, key systems and cellular mobile telephones (CMT).

"Industry argued that they needed some form of investment attraction to consolidate their operations here," Grant says. "Other issues are that the economy has not been performing as expected and Telecom is reviewing its purchasing activities as it adapts to the competitive environment."





# NetWare 4.0 gives you a new view of your enterprise wide network.

Novell NetWare 4.0 is the first product from Novell to be able to give you a truly global view of your enterprise wide network, making administration and management of the network simpler and more efficient.

NetWare 4.0 seamlessly combines all the elements of your network into one cohesive unit, providing an integrated view of the entire network right at your fingertips.

NetWare 4.0 delivers unequalled levels of flexibility and robustness with distributed, replicated directory services.

NetWare Directory Services maintains names and information about every user, group, printer, volume, and any other service found on the network. This simplifies the task of searching through the network to find the resources you need.

True single-point administration is made possible because of the global view provided by NetWare Directory Services, and the automatic distribution and replication of their information across all file servers.

NetWare 4.0 is backed by the extensive technical resources of Com Tech - Australia's leading Open Systems distributor - who provide the expertise required to correctly structure your NetWare 4.0 network before installation.

So, if you want to simplify your enterprise wide network administration, take a global view with NetWare 4.0.

For details of your nearest authorised reseller please phone Com Tech on:

NSW (02) 317 3088 or (008) 263 954,  
VIC (03) 696 0770, ACT (06) 257 7695,  
QLD (07) 832 2699, SA (08) 271 8600,  
WA (09) 322 5605.

Please rush me more information on:

- ☐ Novell NetWare 4.0  
☐ Authorised Novell Training Courses

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Post Code \_\_\_\_\_

My Preferred Reseller: \_\_\_\_\_

Send to: Com Tech Communications,  
PO Box 207, Alexandria, NSW 2015  
or Fax to (02) 693 5917.

**NetWare® 4.0**  
The global network

**NOVELL®**

**COM  
TECH**

All products referred to by their trade names are protected under the provision of relevant trade marks and patent legislation and accordingly none of the products or the names may be copied in any way without the prior consent of the proprietor. All registered or unregistered trade marks referred to are the property of their owners.

Smith Ross & Muir CT3508 AC



# In a multiprotocol jungle...



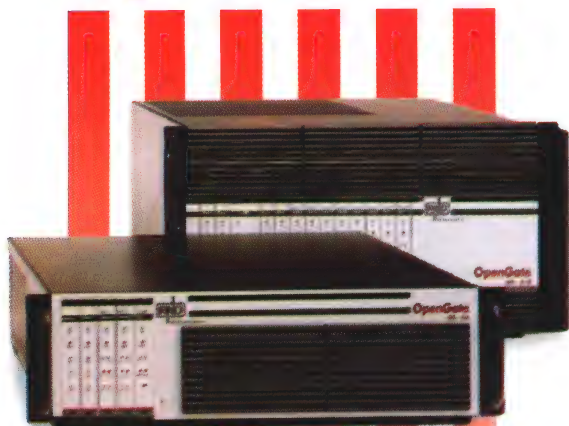
## OpenGate™ clears a path for any protocol.

**Multimedia multiprotocol router with the world's fastest alternate routing.**

Finally, there's an affordable modular router that moves data quickly and reliably from one part of the network to another. OpenGate™. Only OpenGate™ meets the challenge with a RISC processor on every communications module and intelligent shortest path routing. And data keeps moving with fault tolerant system operation and instantaneous path switchover. For remote small offices, you get the lowest cost per connection to regional or corporate LANs, and lots of money-saving extras like Central Access Routing.

To find out more about OpenGate™, call RND today. You'll discover the best way to clear a path for any protocol in your network.

## OpenGate™



FOR  
NETWORKS  
WITH  
AMBITION

### **RAD Network Devices**

**Western Region**  
7711 Center Avenue, Suite 270  
Huntington Beach, CA 92647  
Tel: (714) 891-1446  
Fax: (714) 891-1764

**Eastern Region**  
151 West Passaic Street,  
Rochelle Park, NJ 07662  
Tel: (201) 587-0404  
Fax: (201) 587-0334



Member of the Ipex Group

**TOREN Computer Communications Pty, Ltd.**  
(Member of the Ipex Group)

**Melbourne**  
Tel: (03) 242 5050  
Fax: (03) 242 5055  
**Sydney**  
Tel: (02) 319 2755  
Fax: (02) 699 2093  
**A.C.T.**  
Tel: (06) 253 2665  
Fax: (06) 253 2669



**Dataplex Pty, Ltd.**

**Melbourne**  
Tel: (03) 210 3333  
Fax: (03) 210 3399  
**Sydney**  
Tel: (02) 349 3911  
Fax: (02) 349 7747  
**A.C.T.**  
Tel: (06) 285 3657  
Fax: (06) 285 3696



Grant says industry divided into two clear groups on the IDA issue. The first supported the extension because they wanted more time to lock in their investments and commercial viability. The second group's attitude was: 'Why pick on four product segments when the FTA and PDPs cover a wider range of total business activities in Australia?'

Executive Director of the Australian Electrical and Electronic Manufacturers Association, Alex Gosman, says AEEMA is keen to see what the criteria for exemptions are. "We want to see the criteria in the public arena. We're concerned the whole thing might be a smoke screen," he says.

Ericsson's Corporate Projects Manager, Brian Cox, says his company is pressing for exemption criteria to be made public. "The policy doesn't really go further than requiring companies to be sensitive to government industry development policy. But what are the guidelines and which bureaucrats will make the decisions on exemptions? What DITARD judges to be significant may not impress a company that is manufacturing here in Australia. Some small companies in the cellular mobile telephone area are justifiably unhappy because they fear the multinational companies will get exemptions. The danger is that there may be too many endorsed suppliers outside the 200-point IDA scheme. We believe there should be exceptional circumstances if someone wants to import fully finished CMT."

A spokesman for Exicom says his company has no objection to companies going across to the FTA or the PDP, but the IDA exemption must be fair for everyone.

"Some of the multinationals are only doing a superficial job in terms of their industry development requirements. Not many are doing things from the ground up, and they

shouldn't be allowed into the CPE market through the back door."

Marketing Manager at Telecom Technologies, Chris Lynch, says that while his company has always fulfilled its IDA requirements, the real issue is how competitive Australian manufacturing is against overseas production. He says one of the obvious benefits of having a strong local manufacturing base is that the industry as a whole is insulated against the sort of wild currency fluctuations which the Australian dollar had recently been experiencing.

NorTel's General Manager, Business Development, Laurie Jensen says his company wants to see a single scheme established to reduce the amount of time and effort needed to meet compliance criteria.

Jensen says many industry leaders believe that slow CPE sales means that local industry needs continuing government support. "The Government is clearly trying to prepare the industry for greater deregulation, when prices for cellular mobile phones and other CPE will fall even further. CMT prices have already dropped significantly. Naturally enough, all the carriers have a healthy interest in seeing cost-competitive terminal products, including mobile phones."

Queensland supplier of the Hybrex key system, QTel, says the extension of the IDA is vital. Managing Director, Owen Watts, says a large capital investment in plant and manufacturing by QTel would have been at risk if the IDA had been scrapped. The company's expensive and high-risk R&D would also have been under a cloud.

"We would have had to cease operations immediately because we couldn't compete against fully-imported CPE. At the very least, extending the IDAs has kept 800 to 1,000 Australians in jobs.

**Bernard Levy**

*Ballot from page 22*

■ For those departments that have signed up with AAPT, the document says that these agreements will override preselection because PABXs will already be programmed with the four digit code to access the AAPT network via Telecom's National Connect service, or will be connected to the AAPT network by Telecom leased lines.

Meanwhile, results of the first public market research study into the likely outcome of the ballot appeared in *Time* magazine. Conducted by the respected Morgan Gallup organisation on over 1,300 people, it found that 15% would vote for Optus, 35% for Telecom and 24% said they would not vote. With 26% undecided, Optus looks set to get about 25% of customers, and the initial response should meet the 65% threshold below which Optus has the right to have non-voting customers re-balloted.

Meanwhile Austel has been doing its own market research and has come to the conclusion that the term 'preselection' is a no-no: people just do not understand it. Accordingly the preselection ballot, in name anyway, is no more.

Austel Member, Johanna Plante, told an ATUG meeting in Sydney at the end of June that Austel had decided to drop the term and to henceforth refer to the process as: "The new system for choosing between Optus and Telecom for long distance and overseas calls." When questioned as to why it was 'between Optus and Telecom' and not 'between Telecom and Optus' she said that, because of the sensitivity of the carriers, in written documents, Austel alternated the order of references to the two carriers!

*Stuart Corner is the Editor of Exchange.*

## We deliver CCITT, CCIR, ETSI, IEC EIA/TIA, JEDEC and IEEE

We can supply essential technical standards from these and other international organisations.

We can also supply a range of overseas newsletters and market and technology studies for telecommunications professionals covering:

- International Services Digital Network

- Synchronous Digital Hierarchy
- Asynchronous Transfer Mode
- Virtual Private Networks
- International Resale
- Digital Video Compression
- Virtual Reality
- Fibre Distributed Data Interface
- Fibre to the Home

We offer a personal service backed up by industry and technical expertise.

Call Sally Lloyd  
on (02) 555 7377.  
Fax (02) 818 2294.



**STUART CORNER  
INFORMATION SERVICES**



# HP LanProbe II brings a new level of insight to HP OpenView.

HP LanProbe II can be managed from either an HP-UX OpenView workstation or a Microsoft® Windows™ PC.

## Use HP LanProbe II with the HP OpenView Probe Manager, and manage faults more effectively.

HP LanProbe II is a second-generation Ethernet LAN monitor that spots and diagnoses network problems quickly. Using HP's newest OpenView application, HP Probe Manager, you can access the power of HP LanProbe II from an OpenView HP-UX workstation and get the most comprehensive network management from a single source.

HP LanProbe II supports RMON-MIB,\* the accepted standard for SNMP network monitoring. So you can monitor all the nodes on your network - even if they come from

different vendors - using the largest variety of management tools.

These tools include current statistics for fault management, and long-term trend graphing for performance tuning and network planning. Plus, you get remote packet capture and decoding for protocols such as TCP/IP, Novell, NetWare, Banyan VINES, DECnet, AppleTalk, OSI, 3COM, and XNS to help you locate problems fast and take corrective action directly.

And since HP LanProbe II complies with RMON MIB and other industry standards, your investment in probes and applications is protected.

So, if you'd like more insight into the performance of your network, call

our customer information centre on 008 033 821 or Melbourne 272 2555 and we'll send you a data sheet that explains how HP LanProbe II helps you take network management to a new level.

\*Remote Network Monitoring Management Information Base. All registered and unregistered trademarks mentioned above are the sole property of their respective companies.

**A Better Way.**

 **HEWLETT  
PACKARD**



# Router-Based Compression: Bandwidth Without Choice

A lack of standards makes data compression for routers a strictly proprietary proposition.

Now that access routers have given them a way into the corporate backbone, users at remote sites want to send as much data through that opening as possible. There's only one hitch: with typical access lines limited to 48Kbps or less, all the pushing in the world won't open the door more than a crack. To overcome bandwidth constraints imposed by low-speed links, users are counting on access router vendors to deliver a solution that is tried and true in other networking technologies: data compression.

Several router vendors now offer some type of compression in their products, with others saying they will add compression within the next 12 months. The main reason for the delay is that router vendors essentially have to build new compression schemes to work in router internetworks. Standard compression techniques used in modems and bridges, such as the V.42bis modem standard, were developed strictly for point-to-point links. With routers, compression techniques have to retain the routing information needed to send data packets across multi-hop networks.

The arrival of compression products for routers certainly will help users squeeze more data onto low speed links. But compression will bring some unwanted baggage to router-based internetworks as well. Specifically, standards for router compression do not exist, which means each vendor is tackling the problem a different way. Although most router makers are using the same basic algorithm to compress data, they are using different and incompatible implementations of that algorithm. Some vendors are implementing schemes to compress the entire data stream, including the header information and the data in the packet, while others are focusing on compressing headers or data packets only.

Given the number of approaches and the possible variations, it could be years before a router compression standard is hammered out. In the meantime, the only way to make sure that router compression can run over an internetwork will be to use routers from the same vendor — clearly not a best-case solution in the age of open networking.

Another option — which is now gaining some attention among users — is to handle

compression outside the router. Several vendors now offer standalone devices that compress data before it is sent over the network. Compression schemes built into popular client software — specifically DOS 6.0 and NetWare 4.0 — could help ease the strain on low speed access links as well.

## The Current Line-Up

For the most part, the first vendors to offer router compression are those that are angling for a stake in the access router market. These include Retix, Advanced Computer Communications (ACC), Andrew Corporation, Microcom, and Netronix. For these vendors, compression is a critical product advantage, since their customers are unlikely to run T1/E1 links to every office.

For companies that sell backbone routers, compression has been less of a concern. 3Com offers compression in the new release of its routing software, and market leader Cisco Systems offers compression for IP (internet protocol) headers only. Other vendors offer header compression only when the connection is via the point-to-point protocol (PPP). Although most router vendors say they will bring out more comprehensive compression products, those products aren't likely to appear until 1994.

About the only thing that router vendors agree on when it comes to compression is which algorithm to use. Almost all vendors say they will use some derivative of the compression algorithm developed by Abraham Lempel and Jacob Ziv in the late 1970s.

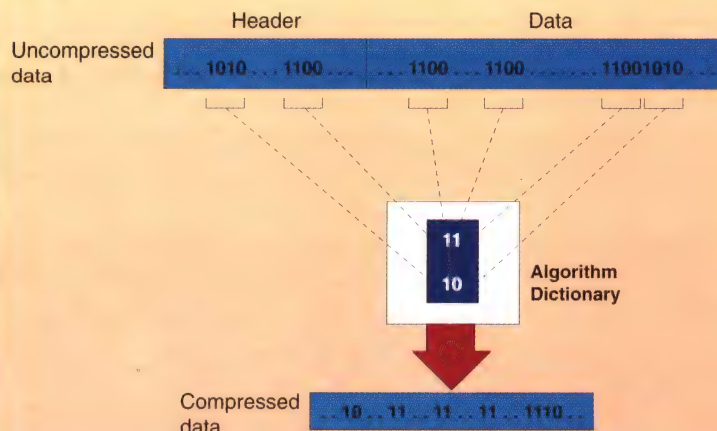
The Lempel-Ziv algorithm takes advantage of redundancies in data to reduce the amount of information that needs to be sent over a wide area link. Lempel-Ziv is a dictionary-based compression algorithm in that it builds a table of repeated strings of binary data. It then replaces those sequences with a fixed-length code called a token, which is transmitted in place of the redundant string (see Figure 1). Using Lempel-Ziv techniques in its RouterXchange 7000 product line, Retix claims compression ratios of 4:1 across WAN links.

The main variations in implementing Lempel-Ziv involve the composition and size of the token dictionary. Because standards governing use of the algorithm do not exist, vendors are using different dictionaries for their tokens. The use of different dictionaries means the router compression schemes will not interoperate even if they are based on the same algorithm.

Vendors set the length of the fields used to determine how data strings will be com-

**Figure 1: A Dictionary for Data Compression**

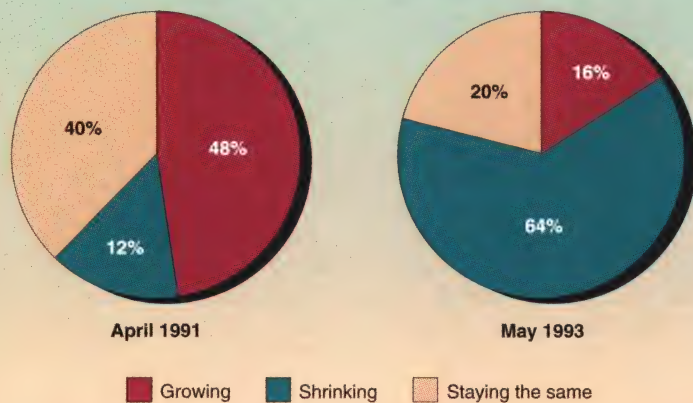
Using a compression algorithm like Lempel-Ziv on a full data stream saves bandwidth because long strings of repetitive data within a single packet are replaced by shorter strings of data.





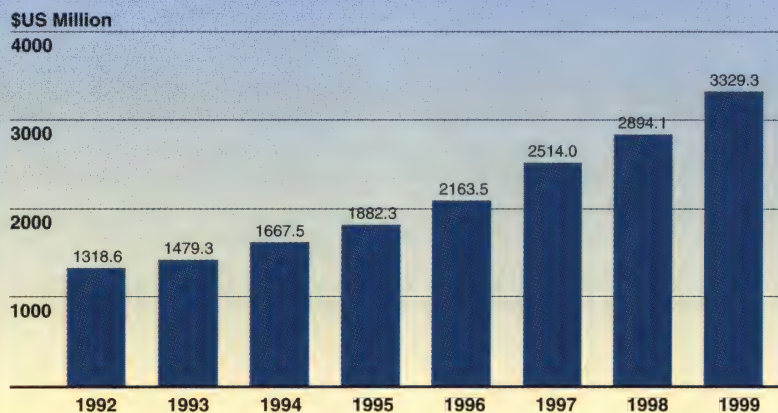
## Market Watch

Is Your SNA Network Growing, Shrinking or Staying the Same Size?  
(% of 50 US Fortune 1,000 Companies)



Source: Forrester Research

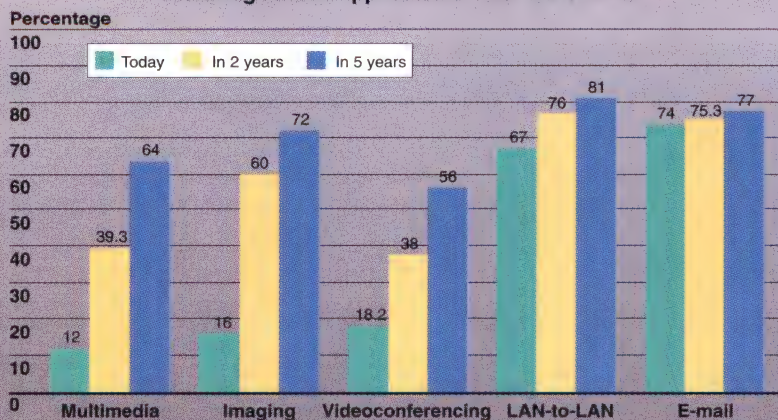
Voice Messaging Services Market: Revenue Forecasts (US), 1992-1999



Source: Frost & Sullivan

Note: All figures are rounded

Percentage of 120 US Fortune 1000 Survey Respondents Now Running or Planning to Run Applications Over WAN Links



Source: Yankee Group

pressed. For instance, some implementations may call for tokens to be used with relatively short strings, while other dictionaries are based on longer strings. The larger the string that is searched for to build the dictionary tables, the more memory and processing power the router needs. Vendors are making their dictionary decisions based on the amount of memory and processing power in their devices. In some cases, vendors are dedicating separate processors in their routers to handle compression.

To compress the entire data stream, vendors could have chosen V.42bis as an alternative to Lempel-Ziv. Adopting V.42bis would have made it easier to develop standards-based compression for routers. But vendors offering full data compression, including ACC, Andrew and 3Com, opted to base their approaches on Lempel-Ziv because it offers better performance than V.42bis. ACC claims its optimised version of Lempel-Ziv offers an effective transfer rate that's 60% greater than that of V.42bis.

Once they've settled on a compression algorithm, vendors have to decide whether to implement compression in software or hardware. To minimise design changes and keep costs under control, most vendors have decided to handle compression in software. Software-based compression can work for lower speed links, but for links above 56-Kbps, hardware help is needed. The additional cost for this hardware can be high for high speed links, according to Sunil Dhar, Product Manager for wide area networking at Cisco. For lower speed links, hardware costs aren't nearly as high, but they could range into the hundreds of dollars.

Only a few vendors now offer hardware-assisted compression. One, Microcom, has decided to "swallow the cost of the hardware," says Mark Freitas, Vice President of Development for the vendor's internetworking products. Like other vendors, Microcom uses a software-only approach for data rates of 56Kbps or below. However, its routers employ hardware when performing compression for faster lines.

## Compression Types

In developing their compression techniques, router vendors essentially have three choices: they can focus on compressing the header information in data packets, the data contained in the packets, or the entire data stream, including header and packetised data (see table on page 35). Each approach is well suited to specific types of traffic.

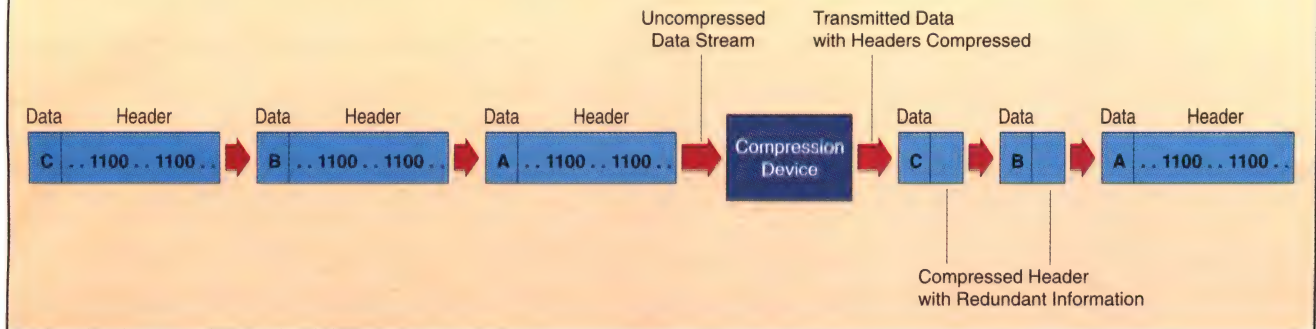
For traffic consisting primarily of small data packets in the same protocol format — such as that generated in transaction-processing applications, the data portion of a packet may be a few bytes, while the header comprises 40 bytes of information.

Since the header in a single-protocol network has a standard format, it's easier to design a compression algorithm to handle



**Figure 2: A Head Shrinker That Works**

Header compression relies on the fact that once a session between two locations is established, much of the header information, such as the source and destination address, in successive packets is redundant.



it. In addition, compressing header data is practical because information in the header typically is repetitious. Information like the source and destination addresses remains unchanged from packet to packet once a link is established between nodes on the internetwork (see Figure 2).

There has been some movement to develop standard techniques for header compression. The Internet Engineering Task Force has produced a Request for Comment (RFC 1144) that specifies a standardised way to compress IP headers. The IETF's spec is the only one that exists for router data compression.

The main problem with header compression is that it is beneficial only to limited applications. Most networks carry a mix of protocols with a range of packet lengths. A different algorithm would have to be applied to compress each protocol's header. The router would have to analyse each header to determine which algorithm should be used, putting a significant strain on the router's processing power. As for packet lengths, when the data portion of a packet is much

larger than the header, bandwidth gains from header compression are less significant.

### Full Compression

For networks that carry larger packets and a range of protocols, compressing the entire data stream or just the data portion of the packet makes more sense. Unlike header compression, compressing the entire data stream is a protocol-independent process. The router doesn't analyse each packet before deciding which compression algorithm to apply, reducing the processing resources the router needs to perform compression.

The downside to full compression is that the routing information in a header is compressed along with the data, so it cannot be used by other routers unless it is restored to its full size. In a meshed, multiprotocol network, a multi-hop path would require several compression/restoration operations to get packets through to their destination.

Because of this limitation, full data stream compression is best suited to point-to-point links. Companies that have deployed networks with star topologies, in which

many remote sites feed into a central location, have the point-to-point connections to make use of this technology.

The third router-based compression option is to compress only the data. Although no data-only compression offerings are available now, this strategy is being explored by several router makers, including Cisco.

The advantage of using this approach is that packets can still be routed over a meshed network because the header information remains unchanged. The main drawback is that it can require a redesign of the router's architecture. Because data compression must be performed before the information is encapsulated in a frame, the router must assume a very heavy processing load.

Rather than rely on router vendors to build compression into their product lines, users ultimately may decide to turn over compression duties to third parties. Two non-router compression options are now available: standalone hardware devices that handle compression tasks, and software that

*Continued on page 49*

## Comparing Data Compression Options

OPTION-TYPE	METHOD	ADVANTAGES	DISADVANTAGES
Router-Based Solutions	Header compression only	Saves transmitting redundant information in header; standard exists for compressing IP headers	Requires a different algorithm for each protocol on the network; only delivers significant bandwidth savings for smaller data packets
	Data compression only	Maintains each packet's full routing information in header	Must put intelligence into router to strip off header and decompress data before passing it to user; uses router processing power
	Full data-stream compression (header and data)	Protocol independent; most useful approach when there is a mix of packet sizes	Available only for point-to-point links
Non-Router Solutions	File compression before reaching router	Numerous implementations available, including compression offered by DOS 6.0 and NetWare 4.0	PCs on network must have memory and processing power required to run algorithms; users must run compression programs
	External device	Compresses full data stream; protocol independent	Requires a separate network device that must be maintained and managed



## Router Management

## Going Beyond Pretty Pictures

Up to now, SNMP-based router management has been a case of much form and very little substance. While routers were among the first devices to pop up in the topology displays of SNMP management systems, for the most part support ended right there. Real management tasks had to be performed using arcane command-line interfaces entered via Telnet or dumb terminals.

But now that routers are key elements in internetworks, network managers need more from SNMP than pretty pictures. For SNMP-based router management to fly, managers need easy-to-use tools that perform a range of management tasks for groups of routers. These tools must work with the platforms that manage other internetworking devices — such as Hewlett-Packard's OpenView, IBM's AIX SystemView NetView/6000, and SunNet Manager from Sunconnect.

Router makers are delivering management software that gives users control over functions like configuration, software upgrades, security, and fault handling from standard SNMP management platforms. Vendors also are teaming up with third parties to tap into the alarm handling, automation, and other features offered by integrated management platforms. Efforts to bring routers into the SNMP management mainstream are likely to pick up even more steam in coming months, as SNMP 2 arrives. Once SNMP 2 and associated improvements are in place, routers may begin to rival hubs as the most manageable internetwork devices.

### Basic Improvements

In tackling the SNMP management issue, router vendors have started from square one, improving the basic quality of router SNMP software agents. In most cases, vendors have added variables to the SNMP management information base (MIB) a router uses to report its status to a management station. Several vendors also have improved router agent algorithms that sift MIB variables to obtain meaningful information.

Wellfleet's new Series 7 software uses 2,000 SNMP MIB objects to provide configuration and control for the vendor's new Backbone Node router. Some of these objects can be activated by SNMP SET commands from a management station for router reconfiguration. Previous Wellfleet router software included about 200 MIB objects that pertained only to device monitoring. The Backbone Node's advanced SNMP features can be activated with Wellfleet's Site Manager software. Wellfleet says it will extend the new SNMP MIB objects across its entire product line.

Vendors are also focusing on improving the quality of the software that handles SNMP variables. SynOptics says its SNMP router management application, Routerman, tracks network performance by mathematically comparing the data gathered by MIB variables. The package can be set up to calculate the overall number of bytes going into the router and to divide that figure by the bit rate of the serial line and again by the overall system time available in the router to help users determine if bandwidth is being used efficiently between devices.

## Management Software Options For Selected Multiprotocol Routers

	SOFTWARE	ROUTERS	INTEGRATED PLATFORMS	REQUIREMENTS
<b>Advanced Computer Communications</b> Ungermann-Bass (03) 696 2006 ADE Network Technology (03) 543 2677	CLI 4000	ACS 4100, 4200, 4400; Access 4500; Nile	Cabletron Spectrum; HP OpenView; IBM NetView/6000; SunNet Manager; Ungermann-Bass NetDirector	DOS; SunOS
<b>Andrew Corp.</b> (03) 357 9111	Client 4000	PathWise/6000 series	None currently supported	SunOS; DOS
<b>Cisco Systems</b> (02) 957 4944	Ciscoverks	AGS+, CGS, IGS, MGS; Series 3000, 4000, 7000	SunNet Manager	SunOS with SunNet Manager
<b>Crosscomm</b> Scitec (02) 428 9555	Internetworking Management System	ILAN	None currently supported	Windows
<b>Digital Equipment Corporation</b> (02) 561 5252	Polycentre Network Manager 200 and 400; Polycentre SNMP Manager 300	DECNIS; DECrouter series	DEC Polycentre Management Solutions	Ultrix, VMS
<b>IBM</b> 13 24 26	Configuration Program; NetView 6000	6611 Network Processor	HP OpenView; IBM NetView/6000	Config. under AIX or OS/2; NetView/6000
<b>Proteon</b> (02) 955 8555	Oneview	CNX 500, DNX 300, p4100	None currently supported	Unix
<b>RAD Network Devices</b> Toren (03) 242 5050	Multiman	Opengate; all other RND routers and bridges	None currently supported	Unix
<b>Retix</b> (03) 629 2595	Retix Vision	Retix 4941, 4942, 4982, RX7000	Netlabs/Manager	SunOS
<b>SynOptics Communications</b> (03) 853 0799	Routerman; Pathman	All SynOptics routers; all Cisco and MIB II routers	SunNet Manager; SynOptics Optivity (both required for Pathman)	SunOS
<b>3Com</b> (02) 959 3020	NETBuilder Management for ViewBuilder/Unix	NETBuilder series	SunNet Manager	SunOS with SunNet Manager
<b>Wellfleet Communications</b> (02) 959 1290	Site Manager	Backbone Node	Cabletron Spectrum; HP OpenView; NMC Vision; Netlabs/Manager	DOS; SunOS
<b>Xyplex</b> NetArch (07) 393 1933	Controlpoint	Xyplex 6220, 3210, 401 series	SunNet Manager	SunOS with SunNet Manager



SynOptics also offers Pathman, an application used with Routerman to automatically trace the path between any two devices in a network, including routers, using information at the media access control (MAC) layer.

Market leader Cisco Systems has revamped its management software to give users better control over router hardware and an easier to use graphical interface. The vendor's recently announced Ciscoworks package contains tools that help managers configure and assign security to groups of routers, gather and display detailed performance information about Cisco routers, and troubleshoot problems as they occur. Ciscoworks also comes with SQL database software for constructing historical reports on router internetworks.

Vendors have made admirable progress in router management software, but their work is far from over. For instance, new management packages offer easier configuration of individual routers, but many do not let managers set parameters for groups of routers at once. Usually, managers must open a separate file or window for each router, or at least click on a router icon to perform the configuration update. Some router vendors, including Cisco, say they intend to add broadcast features to handle group configuration and updates.

Fault management needs more improvement as well. Today, most leading packages let users set the levels at which specific SNMP traps will be activated and alarms sent to a management station. But some vendors, including Wellfleet, don't yet give users the option to set specific thresholds for events reported by the router to the management station. Wellfleet, however, does let users pick those events that will be reported to the station as SNMP alarms or traps. The vendor says it will add user-definable thresholding in a September release of Site Manager.

Even the area of performance monitoring could use some upgrading. Several vendors are considering incorporating the remote monitoring (RMON) MIB in their router management software. Metrix Network Systems says it plans to integrate its new RMON-based Netmetrix Internetwork Monitor with Ciscoworks. This will enable users to automatically activate network analysis using Netmetrix Internetwork Monitor from within Ciscoworks.

Vendors hope to add some of these missing features by bringing their router management packages under the purview of integrated platforms. Packages like HP Openview, NetView/6000, and SunNet Manager offer MIB browsers that give users better control over fault management and the reporting of SNMP information in a network.

For packages that already provide these features, like Ciscoworks and Routerman, the platforms will help integrate router

management with other management packages. Integrated platforms are starting to acquire distributed management and automation capabilities to help ease network traffic and offer faster and easier ways of dealing with network problems.

Vendors offer varying levels of integration for their router management packages. 3Com says it has integrated its NETBuilder Management for Viewbuilder/Unix with the database of the SunNet Manager. This means NETBuilder Management can be launched directly from an icon in the SunNet Manager main menu. Users also can deploy tools provided by SunNet Manager to handle 3Com routers.

Other vendors don't see the need for more than minimal integration — at least until the application program interfaces offered by platform vendors provide tighter integration. Wellfleet, for instance, says it won't go beyond management software from various platforms because it doesn't want to force users to adopt one platform over another until it's apparent that integration will be easier than it is now.

Meanwhile, some third-party developers are creating applications that bring router management and integrated platforms together. One such package, from Stony-

*Continued on page 41*

## Exicom's Ausmode had the idea.

And we had the finance to power it up. The idea was a smaller, lighter, cheaper power rectifier for telephone exchanges. With Telecom Product Development Fund support, it resulted in the birth of a start-up company called Ausmode. The company is now part of the Exicom Group with a developing local market and growing exports to Japan, Thailand, Pakistan, Vietnam, Singapore, Western Samoa, Hong Kong, Papua New Guinea and New Zealand. If you have a breakthrough idea in telecommunications or a related area, phone Telecom on Freecall 008 033 673, or mail the coupon.

Please send me details of the Telecom Product Development Fund.		AC 8/93
NAME _____		
COMPANY _____		
ADDRESS _____		
_____		
PHONE _____		POSTCODE _____
To: The Manager, Telecom Product Development Fund, P.O. Box 249, Clayton, Victoria. 3168.		



TELECOM AUSTRALIA. WE'RE TALKING FUNDS FOR DEVELOPMENT.

DDB Needham RMS 04434/E/AC 8/93/NEW



## System Architecture

### The World According to Microsoft

Microsoft seems to be making some more-than-tentative moves out of its native computing environment. It has recently become involved in broadcast television, and last month turned its attention to porting the flexibility and 'intuitivity' (if there is such

a word) of its icon-based Windows interface to telecommunications.

The long-term aim seems to be to establish links between PC and non-PC type office equipment — a term which includes everything from the telephone handset to the office photocopier. In the process it seems to be devising a new general 'information' command language and mega-architecture which may eventually include signalling over the local loop.

The new 'Microsoft At Work' software 'focuses on creating digital connections be-

tween machines to allow information to flow-free.' The company also describes it as a 'software architecture,' which is gobbledygook for a suite of five related functions — none of which are really clear-cut at present. They are:

- **Operating System** — A new form of preemptive, multi-tasking, real-time operating system which is designed for future intelligent office equipment — telephones, fax machines, photocopiers, printers, and the like. It is designed to be compatible with the Windows Application Program Interfaces (APIs).
- **PC software** — The desktop software for a Windows-based PC. This is a suite of Windows development tools which can be used to create applications software for the new operating system. The applications are created on a standard PC, and downloaded to the office devices.
- **Communications** — These are the protocols which provide the connectivity between the computer and At Work-based devices. This communications language will also work with Windows Messaging (MAPI) and Telephone APIs.
- **Rendering** — This doesn't appear to be 'rendering' in the conventional sense. Microsoft has stolen the term and used it to mean 'formatting' in the sense of indenting, specifying type-size and weight, and so on — everything that distinguishes a word processor from a text editor. The idea appears to be to send a text-file and formatting instructions to the fax machine in ASCII, and have the fax reconstruct and print-out the document's image in formatted form. Alternatively, it can be taken into a PC as text.
- **Graphical User Interface** — This GUI goes with the Operating System to make 'sophisticated features accessible' and to provide 'useful feedback to users.' My guess is that Microsoft may be referring to simple 'context-sensitive' icons and touch-screens with soft-keys here — but there's nothing in the literature about touch-screens.

The illustrations that Microsoft give are to do with faxes, copiers and phones. 'Users will not need to read printed operating instructions to accomplish tasks,' it says. 'A phone could lead a caller through the process of setting up a conference call or forwarding voice mail. The status of a print or copier job could be conveyed instantly via a visual display. Sending a fax to multiple people would be as simple as selecting their names from an on-screen list.'

There's a lot of emotive talk in the published material about 'freeing' people from 'enslavement' of the technology, which has some justification, I suppose. Some people will love the idea of being led through ten levels of icon selections to send a broadcast fax — others (the old PC hackers) will want to do it the old way. If you've visited a

## Technology Update

### More Addresses for Internet

The demand for Internet addresses is doubling every year, according to Chairman of the IP Address Encapsulation (IPAE) working group, David Crocker. This huge growth in demand means the Internet could run out of addresses by as soon as 1995, so to remedy this situation, the IPAE has come up with the Simple Internet Protocol (SIP). By making use of 64-bit addresses rather than IP's 32-bit scheme, SIP effectively doubles the number of possible addresses. The new protocol is backward-compatible with IP.

### Standard APIs for Unix

Six leading Unix vendors have joined together to establish a common set of application program interfaces (APIs) that are designed to ensure interoperability of desktop computing, networking, graphics, multimedia, object technology and systems management applications across their environments. The APIs, called the Common Open Software Environment (COSE), are being sponsored by Hewlett-Packard, IBM, Sunsoft, the Santa Cruz Operation, Novell/Univel, and Unix Systems Laboratories (USL). To ensure that all the technologies it supports are standard, the COSE group is turning to UK-based firm X/Open. OSF has agreed to submit its Motif specifications to X/Open for standardisation to help the effort, and Novell/Univel has agreed to lend specs for its NetWare Unix client for X/Open's approval.

### European GSM Could Link DECT Basestations

A recent meeting of ETSI's RES-3 committee approved a draft of a DECT/GSM interworking profile, which will allow GSM operators to link DECT (Digital European Cordless Telephone) basestations to their network infrastructure. This could allow GSM operators in Europe to establish themselves as telepoint operators in public places such as airports. RES-3 decided to begin work on the DECT/GSM profile last year, and the draft profile is expected to be approved by the next meeting of ETSI's RES technical committee. Full approval, including public enquiry, could take another year. The meeting of RES-3 also received a draft of a profile for DECT/ISDN interworking and decided to support a generic access profile (GAP) and a data profile for DECT systems. GAP is likely to be based on the DECT public access profile, and will define a minimum service level for all environments based on speech.

### BT Develops Networks Using Virtual Reality

Researchers at BT in London are developing a network design and management tool based on Superscape virtual reality software from UK firm Dimension International. Using the desktop package, BT can create a three-dimensional model of its network that lets engineers visualise network status from any perspective. The upper layers of the model show the network as cubes connected by lines, while at lower levels cubes can represent buildings, rooms or equipment. Superscape features 'emotional icons' — cubes that indicate how they should be treated by users. For instance, cubes that represent failure-prone parts of a network can be made to shake nervously, while 'shy' cubes containing sensitive data can be made to shrink away from users. BT says the system is a big improvement on its current GUIs.

### SMC Proposes New Scheme for 100Mbps Ethernet

Standard Microsystems Corporation has presented a new scheme for a 100Mbps Ethernet physical layer that uses the IEEE 802.3 CSMA/CD media access control layer. The company says it presented evidence to the IEEE showing the new scheme to be as robust and compliant to emission and susceptibility standards as the present 10Base-T equipment. It also says the scheme offers a number of advantages that will make it easier to integrate with existing 10Mbps installations. Meanwhile, Kalpana has announced plans to develop products compatible with HP and AT&T's alternative 100Mbps networking standard, 100BaseVG, which offers 100Mbps data transmission over Category 3 unshielded twisted pair cabling.



museum and been led through one of those new-style multiple-choice interactive 'educational' programs, then you'll know what I mean. One person's 'freedom from enslavement' is another's frustration.

Where Microsoft's propensity to muddy the waters shows is in its discussion of the fax-rendering application. Apparently 'all devices in the workplace will readily and efficiently exchange digital information... in a standard digital format that every At Work product will understand.' Well, we already have that — it's called ASCII No.5!

Microsoft's fax 'rendering' seems to me to be ASCII code transmission accompanied by formatting and type-style instructions — which is what every printer-driver has generated since dot-matrix came into being. The real question is, how well does Microsoft's new formatting system work, and why is it necessary — after all, every word-processor has its own.

Is this just TrueType fonts with the addition of basic indents and centering, or is it a replacement for PostScript Level 2? What is this 'rendering' function doing that isn't being done every day by fax-cards — taking computer data in one end, and putting out image files at the other. FaxCast, which I reported on in *Australian Communications* in March (see 'Channel 7 First with the Fax,' March 1993) similarly transports fax messages as data and 'renders' them back into image — so there's nothing new here.

And what about the operating system? Is it just a cut-down version of Windows/DOS without the disk-operating component, or is it something else? Does it include touch-screen input? I've spoken to Microsoft, and read a few dozen pages of technical explanation, but I'm still no wiser.

It seems to me that what Microsoft is proposing is that your telephone become a PC running Windows, with an EPROM-based application that is capable of managing incoming and outgoing text messages, and recording voice calls using CLI.

I guess this software will be what we used to call 'run-time' versions. You will set up the applications on a regular PC with lots of memory, using the 'professional' version of the O/S and the application, then download it to the phone in a cut-down version. If this is so, why not just tell us?

I'm not being critical of the idea, In fact, I welcome it with open arms and say loudly, "It's about time!" The problem I have with the announcement is that the material being circulated is more a statement of philosophy than a technical explanation.

It would be absolutely marvellous to have a world-standard for operating systems and communications protocols — but I suspect that Apple, IBM, AT&T and a few other minor companies may not be too happy at the prospect of Microsoft owning the patent rights.

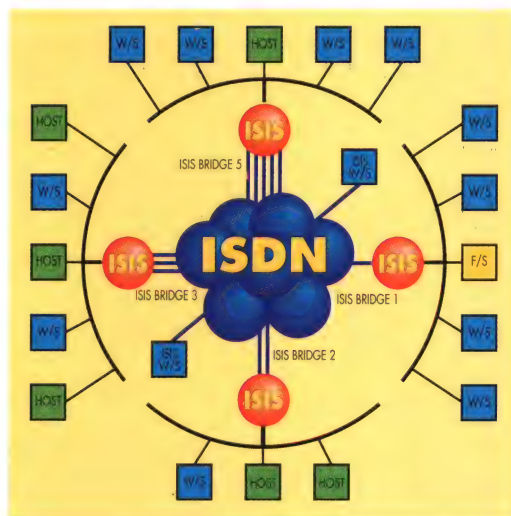
**Stewart Fist**

## ISDN Technology Update

### Merging ISDN with LAN Technologies

#### Essential Features: ISDN Access Servers

- Integrated system. Modular and scalable from 1 to 5 Microlinks.
- On-demand concurrent multipoint and point-to-point call profiles.
- On-demand channel aggregation from 64Kbps to 640Kbps.
- On-demand automatic call setup and knock-down with tenacity.
- MAC layer bridging and protocol sensitive link management.
- Call profile security with dial back and CLIP triggers.
- Remote and local management with built-in protocol analyser.
- Protocol transparent with broadcast and source address filtering.
- Call tenacity, auto call maintenance and ISDN fault recovery.
- Workstation drivers compatible with NDIS, IPX, etc.
- Low cost (<\$3k workstation, <\$6k Bridge 1 System.)
- Austel approved for connection to Microlink.



ISDN topologies offer high speed concurrent access to multiple other ISDN connected services on demand.

#### ISDN's promise of high speed digital connections between workgroups is now delivered.

- Around the world or just around the city, the ISIS LAN Access Server family offers reliable, manageable and cost effective LAN to LAN and workstation to LAN access at speeds ranging from 64Kbps to 640Kbps, on demand!
- Designed from the top down to provide integrated and expandable pure digital connections at the MAC layer, ISIS also includes built-in security and management.
- The **ISIS LAN Access Bridge** is ideally suited for WAN and backbone router integration, remote site access, E-mail and mainframe access over LAN protocols such as IPX, IP, OSI CLNS, DECnet, Vines, XNS, etc.
- The **ISIS Workstation** provides the ideal platform for single station remote access to other peers and LAN systems in a telecommuting environment.
- For further information on ISIS LAN Systems, simply copy your business card onto this page and fax it to Network Designers Asia Pacific Group Headquarters.



**NETWORK DESIGNERS**



Network Designers kn-X Advanced Systems Group.  
Level 9, 22 Williams Street, Melbourne. VIC 3000. Australia.  
Phone (03) 629 3800. Facsimile (03) 629 5791.

Reseller, System Integrator and Dealer enquiries are welcome.



## Multimedia

## Intel, Microsoft to Link PCs, Phones

Industry support has been ringing loud since Microsoft and Intel teamed to link PCs with telephones via a unique technology approach.

In May, Intel and Microsoft announced the Windows Telephony Application Programming Interface (API), under development in Intel labs for two years. Microsoft joined in the development process last year, and more recently the two firms have pooled a wide range of telephone equipment makers and software companies to gather feedback and rally approval for the new standard, which integrates the telephone with the PC running Windows.

The Windows Telephony API provides an abstraction of telephony services to application developers. It gives the mechanisms to allow independent applications to share the same calls and for interactions with other APIs to allow access to voice, data, and fax on the call. Developers may use the API without having to worry about the specifics of dealing with the actual

telephone network that will provide those services, Intel said. For example, the network may be the analogue telephony network, a Rolm PABX, a Northern Telecom PABX, an ISDN connection, a cellular connection, and so on.

In addition to the API, the Service Provider Interface (SPI) was also announced. This interface is implemented in the different service providers to allow the API to operate with the telephone network. A service provider includes the driver level software and any related hardware which can allow connection of the SPI to the telephone switch or network, Intel explained.

The technology is not new — in fact most switch vendors have products today that integrate the PC and the phone. Some have even defined APIs that allow application developers to write applications for these products.

However, to date most APIs are proprietary or tied to a specific product offering. In the case of Windows Telephony, specs were reviewed by some 40 companies, including most major telephone switch manufacturers, all major voice mail and voice processing vendors, PC hardware, silicon and peripheral manufacturers, software application developers and network providers. Supporters include Lotus, Compaq, DEC,

Northern Telecom, AT&T, Siemens/Rolm, Alcatel, Mitel and Ericsson. Most are expected to unveil product offerings in the next couple of months, with a slew of productivity applications expected by year-end.

"This technology has drawn an unprecedented level of cooperation among major telecoms vendors which in the past rarely agreed," said Charles Fitzgerald, a Microsoft product manager.

Microsoft and Intel have even claimed support by Novell and AT&T, which have been working on a similar server-based technology. AT&T said although it supports the technology, it will be working to take it a step further. The program between AT&T and Novell, called Telephony Service, will integrate telephones and computers from multiple desktops, including DOS, Windows, OS/2, Macintosh and Unix.

Industry analysts are of the opinion that the Microsoft/Intel marriage is a good first step, particularly because of the high-visibility of the two companies, adding that the technology had to be 'legitimised' by a big name to move forward, and that Microsoft and Intel have served that purpose. However, one down-side could be that the technology has been taken out of the hands of telecoms carriers and placed under the control of Microsoft and Intel.

# 3Com's new hub is also a hub, a

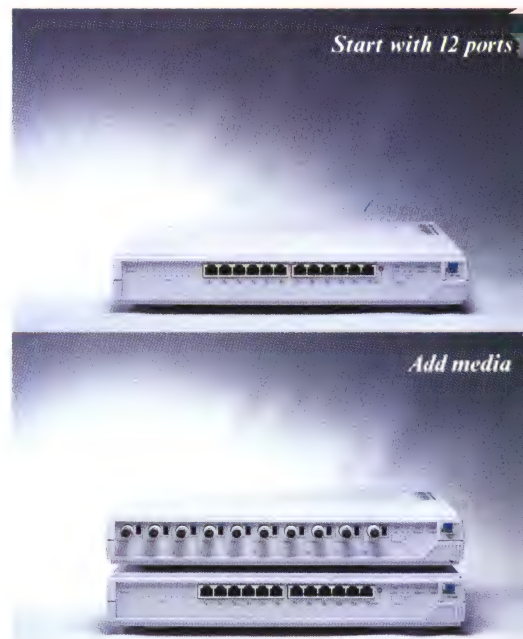
It used to be that a hub was a hub. But now there's a hub that will grow and change with you. In more ways than ever.

Introducing the new LinkBuilder® Flexible Media Stack hub family. The most cost-effective alternative to chassis-based hubs, with the flexibility to meet the demands of your network now and years from now.

Every hub in the LinkBuilder FMS™ family is stackable. You can add ports, management capability, and different types of media whenever the need arises.

You can start with 12 ports. Then start stacking. You can connect four units in all, and they'll act as a single, logical repeater. Even if each box features different media. Like coax, 10BASE-T, and fiber.\*

Need to add management? Simply buy a single Manage-





The software layer that maps between the Telephony API and SPI, jointly developed by Intel and Microsoft, will be available to developers as part of a Telephony Development Kit for Windows 3.1 later this year. Windows Telephony will be included as a standard component in the next major release of Windows (expected in Q1 1994).

Fruits the technology will bear will include such applications as telephone centric (also referred to as visual call control), where the user controls phone functions via the PC. For example, a Rolodex of names and phone numbers can be dragged across the screen with icons and 'clicked on' to dial the party, while others can be 'clicked on' for conference calls.

Integrated messaging, including electronic mail, fax and phone messages is also expected to be a hot application by participating vendors, under a category called 'smart phones.' Users may see a range of these applications appearing by the end of the year.

Another class of applications called conference video is expected sometime next year. The application will allow two parties speaking across the phone lines via their PCs to view the same images simultaneously on their computer screens.

**Charlotte Dunlap**

*Router Management from page 37*

brook Services (based in Bohemia, New York), is a suite of snap-in applications for managing Cisco and Wellfleet routers from Novell's NetWare Management System (NMS). The Stonybrook software has the ability to show a unified view of routers and Novell LAN file servers and workstations.

## Waiting for SNMP 2

SNMP 2, which at press time was on the verge of being published as a proposed standard at the Internet Engineering Task Force (IETF), promises to yield several innovations particularly attractive to router management. These include a bulk data transfer facility that can move routing tables considerably faster than is possible under the existing SNMP, as well as improved security and manager-to-manager communications. All vendors say they plan to incorporate SNMP 2 in their products when it is finalised as an IETF standard.

Several vendors already have created prototype agents and managers. In a recent US demonstration DEC used a prototype SNMP 2 manager with bulk data handling to load routing tables within a minute; with the current version of SNMP, the same task took several minutes.

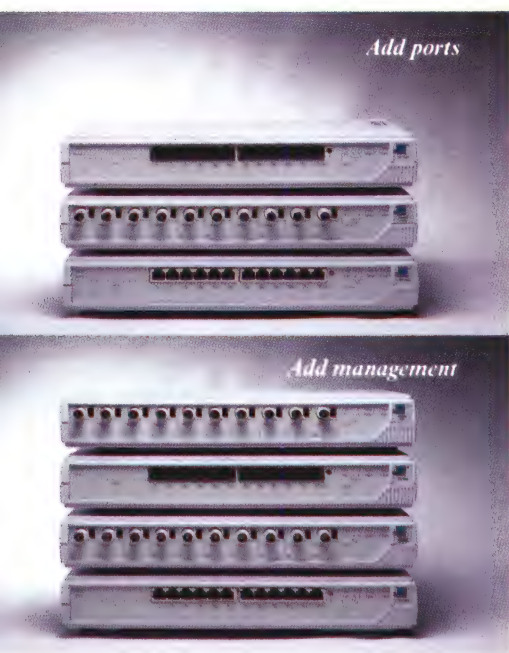
Router vendors compensate for the original SNMP's security weaknesses by adding their own security features. SNMP 2, which requires a new Secure SNMP, will let users tap the standard security features of platforms like HP OpenView, taking the burden off router management packages.

Perhaps the most dramatic changes that will be generated by SNMP 2 will be in the area of hierarchical management, in which management packages can interact with other management stations in a distributed network as agents or managers, or both.

Wellfleet says that one of its current customers, a financial institution based in New York, has expressed an interest in hierarchical management. The company would like to keep its global network continuously active, shifting the central management station from the US to Asia and then to Europe, to coincide with peak business hours. Wellfleet says SNMP 2 will allow local routers to send information to local management stations equipped with Wellfleet's router management software and other applications. These stations will gather information as agents; then, as managers, they will filter it and send it on to a central management station, whose location will change three times a day.

**Mary Jander**

# hub, a hub, and a hub.



ment Module to plug into the rear of the bottom unit. The entire stack is now managed.

And to help you craft your network, we'll include a free EtherLink® III Parallel Tasking™ 16-bit adapter board with the purchase of any LinkBuilder FMS hub. EtherLink III boosts performance 25 percent over the leading adapter today.

Call 3Com on (02)959-3020, ext. 22 for details and free information on our hub family and the LinkBuilder FMS. And find out just how flexible a hub can be.



\*Fiber available early 1993. © 1992 3Com Corp. (408) 764-5000.  
3Com, LinkBuilder, EtherLink, FMS, and Parallel Tasking are trademarks of 3Com Corp.



# SNA OVER LAN – MAKING THE MOST OF EXISTING RESOURCES

## RAD Offers the Key to Successful SNA/LAN Integration: Freedom of Choice

With RAD's new family of standalone SNA/LAN converters, you can now migrate your SNA/SDLC devices to multiprotocol LAN backbones without being locked into one particular internetworking strategy.

Supporting Token Ring and Ethernet, RAD's products enable seamless SNA/LAN transport by converting data from cluster controllers, FEPs and other SDLC devices into Logical Link Control (LLC 2) packets and vice versa. You can integrate your SNA traffic over a faster, more robust LAN/WAN backbone.

### Consider the benefits of using RAD's standalone converters:

- Eliminate dedicated SDLC lines
- Save on upgrade of IBM-3174
- Connect IBM-3274 to LAN
- Substitute cost-effective converters for pairs of bridges
- Local SDLC polling saves WAN bandwidth
- Route SNA/SDLC traffic over IP backbone using any major vendor's router
- Save on management costs (and NCP fees)
- Upgrade SDLC link speed

Why be tied to a single vendor solution when RAD offers you the freedom to choose the most cost-effective migration strategy?



### SNA/LAN Product Family

- STC** Controller to Token Ring converter, supports up to 2 lines and 15 controllers
- FTC** FEP to Token Ring converter, supports up to 15 PU type 2.0 LAN connected devices
- SEC** Controller to Ethernet converter
- FEC** FEP to Ethernet converter
- RR-STC** RADring hub module SDLC to Token Ring converter. Full hub supports 10 STC-2 modules, linking up to 150 PU type 2.0 devices



**data communications**

#### Intl. Headquarters

Rad Data Communications  
8 Hanechoset Street  
Tel Aviv 69710, Israel  
Tel: 972-3-6458181  
Fax: 972-3-498250

#### Australia

Dataplex Pty. Ltd.  
P.O. Box 526  
234 Whitehorse Rd.  
Blackburn 3130, Victoria  
Tel: (03)210-3333  
Fax: (03)210-3399

Dataplex (Sydney)  
Level 6, Eastgardens Office Tower  
Bunnerong Rd. & Wentworth Ave.  
Pagewood, N.S.W. 2035  
Tel: (02)349 3911  
Fax: (02)349 7747

#### New Zealand

Dataplex (N.Z.) Ltd.  
Tel: (09)307 8139  
Fax: (09)377 4744

Argentina (1)3314276, Australia (3)2103333, Austria 222.601011698, Belgium (15)290400, Brazil (11)8875544, Bulgaria (2)725010, Canada 416-477-9977, Chile (2)5568390, China (1)2026393, (852)8922288, Colombia 6110111, Cyprus (2)449171, Czech Republic 422-366251, Denmark (42)919555, Egypt (2)735415, Finland 0 8036033, France (1)47118300, Germany (89)3189910, (89)716068, Greece (1)6547400, Hong Kong 5617700, Hungary (1)186-8004, Iceland (1)681665, India (11)2243092, (812)333415, Ireland (1)619066, Israel (03)6458181, Italy (2)27422565, Ivory Coast (225)322751, Japan 3.52757910, Korea 972-3-6458181, Macau 853-336676, Mexico 525-6828040, Netherlands (10)2620133, (15)609906, New Zealand (9)3796882, Nigeria (1)967598, Norway (2)680650, Panama (2)13835, Papua New Guinea (675)252555, Paraguay (21)490076, Peru (14)333410, Philippines 2.8125068, Poland (26)280627, (58)210818, Portugal (1)8519980, Russia (95)2054749, (95)4375298, Singapore 4792088, Slovenia (61)122281, South Africa (11)8862200, Spain (1)6630100, Sri Lanka (1)573692, Sweden (8)6260650, Switzerland (14)917744, (22)3431150, Taiwan (2)7716333, Thailand (2)2332261, Turkey (1)2746894, U.K. 908 262121, Uruguay (2)923592, Venezuela (2)7624624.





Graeme Le Roux

## NT or not NT? — A Number of Questions

Microsoft's Windows NT is, at the very least, an interesting beast. It's Microsoft's first 'generic' operating system (in the sense that it can be run on a variety of processors and a variety of platforms for each of those processors) and not a 'PC' operating system like OS/2. Rather it is an operating system which can be run on certain PC (i.e. Intel 80X86-based) platforms.

As those who read 'Inside Microsoft's Windows NT' by Dennis Linnell in the June edition of *Australian Communications* will be aware, NT achieves this by virtue of a small machine-specific layer of code called the Hardware Abstraction Layer (aka HAL). The catch is that, while there is a 'generic' HAL layer, NT is not guaranteed to function properly on anything but the specific platforms given in the NT compatibility list. In short, just because your clone server is IBM compatible and runs OS/2 don't bet it will run NT. It may load NT and it may, apparently, work as a test platform but you may find intermittent problems in operational use and you should not expect too much in the way of help from your dealer or Microsoft. I'm told that there are around three million lines of code in NT. The file set which gets installed on a given machine is a subset of that code and is heavily dependant on the HAL layer; the HAL layer in turn is machine-specific not just processor-specific.

Another point which needs to be underlined about NT is that it is not a network operating system; rather, it is an operating system with basic networking capability. As a result, comparisons with Novell's NetWare have limited validity. For example, NT appears to be far better than NetWare server software as an operating system when processing benchmarks are examined, which should not surprise anyone — so are most forms of Unix, VMS, OS/400 and most other operating systems. This is because NetWare server software is designed to provide little more than file and print services and the ability to host third party network services via NLMs. NetWare is not intended to be a generic operating system — after all, that's Univel's intended market.

What NetWare (and it must be said most generic operating systems these days) does have over NT is the ability to bridge/route internally — i.e. on the server. This means that you can set up a small LAN, add a second network adaptor to the server, connect this second adaptor to a backbone and workstations can use the server as a bridge/router to access resources across the backbone. You do not need to buy an external bridge or router (assuming you have low to moderate traffic levels). You can buy add-ons to NetWare which enable this sort of thing over a WAN.

NT does not have this facility in its present form. No network operating system from Microsoft ever has. Microsoft has always relied on OEMs to provide this facility. Microsoft tell me that with NT they are not leaving this important issue in the hands of others. They are working on implementations of routing for TCP/IP and the other protocol stacks which they will release in the future but, for the moment, external bridges and routers are required for NT-based internetworks. Unfortunately, at the time of writing, details and release time frames were not available for any of this.

Having compared NT to some minicomputer operating systems above — which I believe is more reasonable than comparing it to

NetWare — I must point out that there are certain things which, while accepted as 'standard' for a mini's OS, are outside the parameters of NT. The most obvious one is support for terminals. Microsoft's philosophy of computing to date has been one based on one processor — i.e. computer — per desktop. In many cases there is no economic or practical justification for putting a full blown computer in front of a user. Examples include warehouses, production environments, retail outlets etc.

Unless Microsoft changes this policy, NT out of the box will probably never support terminals. Third parties and OEMs will undoubtedly provide NT drivers for various types of port controllers which might support terminals and NT's Streams interface will provide developers with an API for support of standard terminal servers across a network, but I doubt Microsoft will ever do this directly.

Terminal support aside, high end NT platforms have the potential to displace minicomputers and possibly some smaller mainframes in corporate data centres to some extent. Remember NT is not a PC operating system. When running on multi-headed Pentium, Alpha or MIPS-based platforms NT has all the power and features found on machines like AS/400s, low to mid-range VAXes and many Unix systems. This is particularly the case when NT is combined with the 32-bit version of Microsoft's SQL server. What will govern the rate at which NT displaces more traditional platforms is the cost of software migration and the cost of retraining operations personnel.

NT is an attractive alternative in a data centre because most of the high end hardware on which it runs does not require special environmental conditions and costs significantly less to purchase and maintain than a more traditional system. It is also possible to provide a completely isolated development environment at an economical price by doing development work on PCs running NT rather than sharing a production platform. You will not save money on personnel with NT in the data centre. You will need the same internal (and external) operations and support infrastructure you have now for the same reasons.

So much for NT in the basement, what about on the desktop? I doubt very much if NT will have much impact on Australian corporate desktops until applications which require it arrive. At present, all NT offers corporate users is slightly more security over data held on the desktop — which is probably not where it should be stored anyway. If you can justify the cost, NT also provides freedom from dependence on the Intel processor and if you need it, an alternative to Unix on a powerful workstation.

In summary, NT is a product you should at least be evaluating as a server platform. I believe that the sooner Microsoft can give reliable time frames for delivery of features such as internal bridging and routing, OSI support and software distribution applications such as those it has shown as 'technology demonstrations,' the sooner NT's true potential can be evaluated.

*Graeme Le Roux is a Director of Moresdawn Pty Ltd (Bundanoon, NSW) and specialises in local area network consulting services.*

---

*"Another point which needs to be underlined about NT is that it is not a network operating system; rather, it is an operating system with basic networking capability."*

---



## CAS Services: A Tale of Many Protocols



David le Comte

In 1992, Optus Communications foreshadowed a proposed 2Mbps digital interface to their switched network, which would (possibly) be offered to customers. The Standards Advisory Committee (SAC), which is Austel's chief advisory body on standards issues, proposed last August that the Technical Standards be amended to include requirements on Customer Equipment (CE), used on such a service. Shortly after this meeting, Telecom gave notice that it might wish to launch a similar service.

These services offer a variable number of digital voice channels (up to 30) on a single 4-wire circuit. They utilise the same physical layer specification as Primary Rate ISDN and 2Mbps digital tie lines and are often referred to as Channel Associated Signalling (CAS) services, as the signalling is divided into 32 separate streams, each being associated with a single digital voice channel. These streams are then multiplexed into timeslot 16, with each having an individual bit rate of 2,000bps.

By contrast, an ISDN connection uses a common channel. Control information for each channel is centralised, and is sent/received as a stream of packets in time slot 16.

Such CAS services have been used by PABX suppliers over digital 2Mbps tie lines for some years. As one might expect, several variations have developed. The basic method of how these streams are multiplexed together, and the basic dialling protocols, are similar, but at a detailed level they are incompatible. Several companies sell protocol converters designed to connect different PABX types (or generations) together via 2Mbps tie lines. The most commonly available converter is an MFC (in-band signalling) to R2 converter. The R2 protocol is similar to the protocols being proposed.

The service foreshadowed by Optus uses a protocol which has been dubbed P3 in Australia. It was developed for Mercury in the United Kingdom on Northern Telecom DMS100 exchanges. It differs in many (minor) ways from the service proposed by Telecom, which has been dubbed P2 in Australia. The service proposed by Telecom is closer to the protocols used by many of the larger PABX suppliers in Australia on digital tie line circuits.

A new draft of Technical Standard TS003, which covers PABX and key systems, was then prepared and distributed for public comment. This draft included both protocols. The public comments were generally of the opinion that only one protocol should have been included in the standard. It was felt that this would make it easier for users to change carriers, and would be simpler for PABX suppliers to support.

The SAC found itself in the position where it felt it should choose just one protocol. Unfortunately, neither protocol had a technical advantage over the other. A protocol, referred to as R2D, is specified in the CCITT documentation and is very similar to P2. Despite this, both protocols differ from, or extend beyond, CCITT specs. Quite reluctantly (the reluctance was noted in the minutes), the SAC recommended to Austel, and to the Austel Board, that Technical Standard TS003 be adopted in its current form with both protocols. Further, the SAC minutes noted that in allowing both

protocols they were making an exception which would not be repeated. The outcome of this recommendation had not been disclosed at the time of going to press.

While it's understandable that the SAC strongly contended that the Technical Standards should have had one protocol rather than two, it is in fact this contention which lies at the heart of the SAC's mistreatment of the issue. There already exists a standard which is recognised in Australia, as well as internationally, for a 2Mbps digital interconnection with a switched (digital) telephone network. This standard is called Primary Rate ISDN. The SAC meeting minutes indicate that it was not discussing whether or not there should be one or two protocols. It was, in fact, discussing whether or not there should be two or three protocols. Put in this light, if one is going to allow more than one protocol, why pick only two, or three, why not as many as the carriers propose? Who knows? One of the new carriers after 1997 may have some new super-duper 'ZX31' protocol.

Having allowed the two carriers to provide 'proprietary' services, it would be unfair for them to deny the same opportunity for one of the new carriers after 1997. The SAC's statement that only one service should be allowed can only be considered seriously if that service was ISDN Primary Rate.

Some might argue that the ISDN is different from the PSTN, and that these new services are PSTN connections. This argument is invalid, because the standards are for customer equipment. Customers of a switched telephone network are, ultimately, only interested in the services of a network, not the names used by a telephone company to describe the elements of that network. More to the point, these new services are expected to be tariffed more aggressively than ISDN services, so everyone assumes that they should be treated differently. That the carriers, or their switch suppliers, would charge less for these services seems likely, but their reasons for doing so may not necessarily be cost related. I find this issue most interesting, and more relevant than the perceived differences.

Those who have shown concern at the possibility that the carriers could use these services to lock-in customers have strongly urged that only one CAS protocol be adopted. Instead, they should have recommended that only ISDN be used and urged for tariff liberalisation. Most suppliers of larger PABX systems now provide ISDN Primary Rate connections.

The SAC had two other ways to handle these proposals. The first alternative would have been to exclude the services on the basis that they were not internationally recognised. The second alternative would have been to treat them as Supplementary Services to 2Mbps tie line services. These proposed CAS services are little more than minor twists upon the common usage of such connections, and TS016 already exists to ensure that such CE would be safe, and meet minimum requirements at the Physical Layer.

This latter alternative would certainly have avoided a lot of unnecessary fuss.

---

*"While it's understandable that the SAC strongly contended that the Technical Standards should have had one protocol rather than two, it is in fact this contention which lies at the heart of the SAC's mistreatment of the issue."*

---

*David le Comte is the Managing Director of Pollstar Communications. He is based in Sydney, NSW.*



First time in history

# SECURE, REDUNDANT, STACKABLE

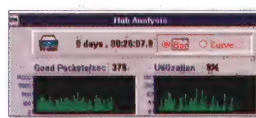
appear in one sentence.

And in one

# HUB.



**D**-Link DE-1200/1600 Ethernet hubs give you much more than just departmental hubs; they give you features that once exist only in larger and more expensive enterprise range products. Features like eavesdrop protection and intrusion control offer security for your otherwise unprotected data. Redundant SNMP agent comes up when the primary one goes down -- a feature that gives you fault-tolerant network management. Stackable architecture



▲ D-View SNMP network management program

that is so flexible you can start with the DE-1200 12-port standard hub and later on slide in a SNMP module for easy network management. Or you can daisy-chain a DE-1600 intelligent hub to a DE-1200 stack and gain network management capability. Unbeatable features and total flexibility, the DE-1200/1600 series Ethernet hubs represent the best overall values for your departmental needs.



◀ Slide-in SNMP module

**D-Link**  
CORPORATION  
TEL: (886-2) 916-1600  
FAX: (886-2) 914-6299

**Hardie Networks** TEL: (03)890-0900  
**Kincolith Pty. Limited** TEL: (02)977-4466  
**Toren Computer Communications** TEL: (03)242-5050





Alan Lloyd

## Designing For Messaging Systems

Last month's tutorial introduced network design for today's business environment, highlighting the migration and integration issues, scaling of networks and the need to consider operational aspects of the system. This month I want to tackle the design of message- and file-based networks. The network design process usually considers messaging as nothing more than e-mail or something that runs over the LAN. Message-based networks of a specific scale do work, but the larger they are and the larger the load that is placed on them, the more likely it is that traffic volume problems will surface.

This traffic issue is particularly important today because the style of networks is rapidly changing, there is a widespread growth in message-based applications and each organisation is becoming increasingly dependent on its IT infrastructure. Not considering traffic issues may only result in slight performance problems, but they will be on a grand scale!

Message-based systems can be examined from a number of different perspectives, none of which are exclusive or should be a single characteristic of the design. They are very much business dependent. Value judgments will depend on technology costs, legacy systems, integration levels, business

dependency and operational requirements. While there are several standard approaches to message-based networking using LAN server-based e-mail systems, the incorporation of OSI standards into a large scale distributed system for business purposes may change the rules.

Figure 1 shows the most common message system design perspectives. Note that the message system design does impact the business procedures and information flow. It also affects the design of the supporting network and communications infrastructure and, naturally, the organisation's naming and addressing schemes.

### Message Information Consistency

As all message-based systems exchange messages, where possible the syntax and format of messages should be consistent across the enterprise, even though incompatibilities do exist. In the short term, word processing packages and e-mail systems provide document (syntax) conversion utilities. This solves the problem of differing document syntaxes, but probably does little to formalise inter-department and inter-company procedural information flow.

Strategically, it makes sense to provide policies that formalise document structures

This is one of a series of open systems tutorials by Alan Lloyd, Strategic Developments Manager for Datacraft Australia. Alan represents Australia on numerous international standards bodies and is the co-author with Gary Dickson of *Open Systems Interconnection* (Prentice Hall, 1992).

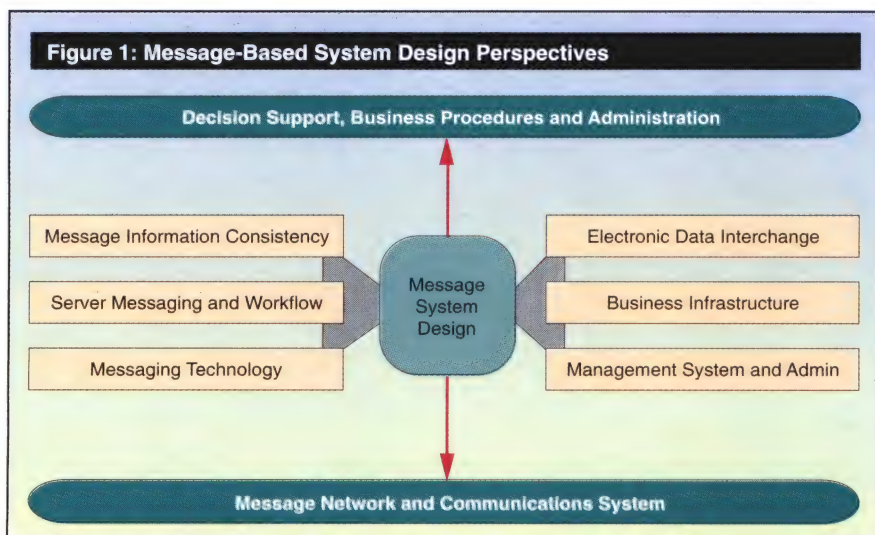
and formats, particularly where documents support formal processes within the company (e.g. ordering, service calls, management reports, personnel management, etc.), quality procedures, or represent the company to its customers. One aspect of formalising document structure is that documents are usually determined by the application and their usage is limited. In dealing with the wider organisational perspectives, document formats, the processes that support them and the references applied to them should be determined consistently across the total business.

To help in the design process, documents that apply to company procedures should be uniquely referenced, so that network designers can see what information within the organisation can flow on a message-based system and then implement the applications and procedures that use them. This approach is particularly useful if quality controlled system procedures are being implemented. Growing large scale inter-departmental mail systems that have inconsistent information and inconsistent procedures attached to them is not recommended.

The standards now associated with document information are SGML (Standard Generalised Markup Language) and ODA (Open Document Architecture). Support for these standards from office automation software suppliers and mainframe vendors is increasing. Document layout and formatting will depend on the message's use, such as e-mail, reporting, EDIFACT interchanges or spreadsheets.

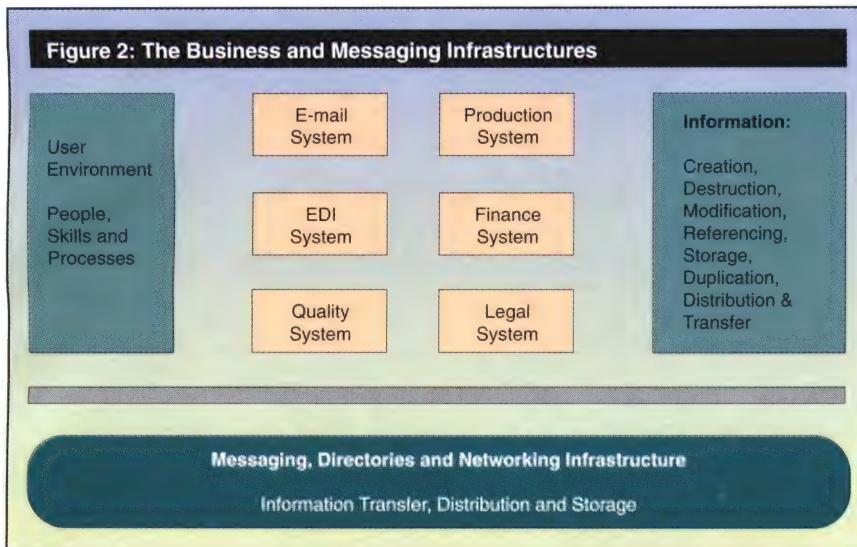
### Server-Based Messaging and Workflow

Workflow office automation technologies are rapidly entering the marketplace. They incorporate standard desktop office automation technologies and permit informa-





**Figure 2: The Business and Messaging Infrastructures**



tion flow between and within workgroups via the underlying e-mail/messaging system. Users communicate via messages, which are generally supported by file transfer mechanisms within the system.

The approach to this type of network design is both procedural and functional. For example, the design might allow staff in one department to fill in holiday leave requests or overtime sheets and pass them to staff in another department for processing. The forms are prepared by all staff with their word processing utilities, using defined templates, and are sent directly to the payroll office for processing.

In such cases, the system design is really the implementation. Workflow products are purchased, installed and the workflow and human procedures circulated.

In a more considered approach to workflow networks, the nominal message size, distribution and arrival rates should be evaluated. Averages should be assessed for all workflow procedures used across the organisation and the aggregates understood. If one class of staff can access 20 workflow procedures, it is unlikely that he/she can use all 20 at once! Nevertheless, the traffic calculated for the network is based on the nature of the procedures and the concurrency and size of the messages, not just the fact that overtime sheets can be sent to the payroll office.

With workflow and message-based systems, the administration of the total systems file space is very important. Humans have a tendency to keep a copy and send copies to all the people they know. This results in gigabytes of replicated, ownerless information. In the message environment, both administrative/procedural and message reference driven tidy up tools are fundamental.

## Electronic Data Interchange

EDI comprises the exchange of messages whose syntax is (hopefully) defined by one of the major international standards such as

EDIFACT, UNTDI or ANSI X.12. The messages have a number of design components: format (syntax), semantics (what they do), protocol exchange behaviour (order, delivery notice, invoice, payment notice, errors detected, etc.), supporting infrastructure and protocols (X.400, SNA, etc.), details of originators and recipients (naming, addressing and geographical network flow) and audit procedures.

EDI is often considered from a business application environment and its network support is based on inter and intra-organisational trading requirements. The messaging-based network design therefore includes wide area links to the trading partners in addition to the usual message size/flow characteristics of EDI applications.

The EDI aspect of message system design is usually the most tangible and can be accommodated without risk. EDI messages can be supported over X.400 in a number of ways. The most common is as a personal mail Body Part (a P2 body part), with the EDI information being a text (e.g. EDIFACT formatted) message. This transfer mechanism will evolve to EDIFACT being supported by X.400 Pedit content types in

the future. The risk lies in uncoordinated naming and addressing and uncontrolled growth without audit facilities, trading profiles and network interface consistency.

## Network Technology Approach

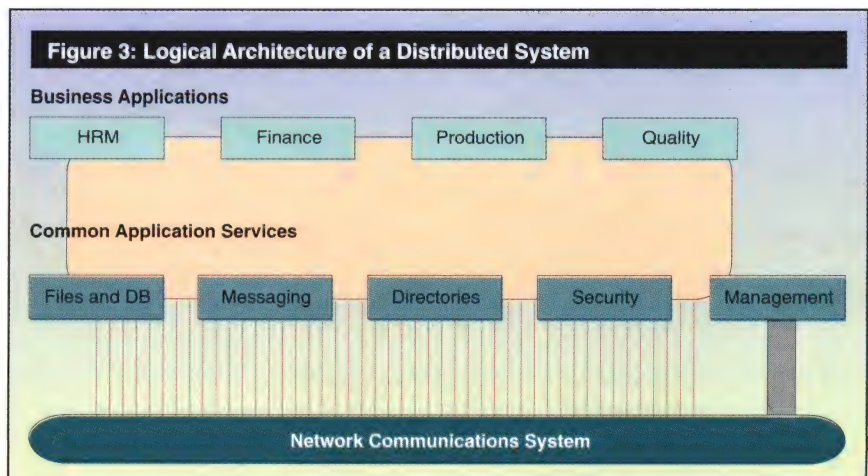
The technology approach to messaging systems can be one of providing LAN servers with host connectivity and using the network operating system (NOS) and/or a network file system (NFS) as the interlinking mechanism for the messaging functions. In both cases the network is a message/file-based system. One can then supplement the NOS/NFS with mail packages and gateways and possibly integrate X.400 or a gateway to it.

This bottom-up approach to the business messaging system is usually designed in a 'connectivity' way. It may work but the issues of scale, business procedures, location of information and responsibility for the system and the information in it, are sometimes left in the hands of the nearest user. In this way levels of service may be inadequate, because this approach sometimes seeks all things for all users and ignores network costs and capacities or the real business need.

X.400 use is a technology approach to messaging. It can be considered as either an e-mail engine or it can be seen as the part of the world's messaging technology which provides infrastructure to the business.

The main considerations for implementing X.400 are its naming and addressing scheme and its scale within the organisation. These how big, how much, where and when questions are all tied to the business goals. Issues of management and administration, directory use, skills training and product related functions such as billing, security management, fax gateways, and fault management systems are also important. These issues mean looking at X.400 not just from a standards viewpoint but also from the perspective of product features, operational costs and worldwide service levels. The use of these parameters is essen-

**Figure 3: Logical Architecture of a Distributed System**







## AT&T opens up endless possibilities with the DEFINITY Communications System.

Face it. You've spent hundreds of thousands of dollars to bring your company's phone system into the eighties. Only to discover it can't make it into the nineties. Do You: a) Admit you're only human. b) Try to squeeze another six months out of your current system. c) Replace your current system with the latest model that's built for obsolescence. d) Invest in the last communications system you'll ever need.

If you answered 'd,' your choice is AT&T's DEFINITY Communications System. That's because the DEFINITY Communications System is the only system with a modular configuration that takes you from 40 lines to a seemingly endless 30,000.

In most cases, you can add those extra lines, simply by adding on to the modular base. And AT&T the world's largest Telecommunications

Company now in Australia, can help you plan those additions, so you don't have to shut out your customers' calls.

So if your old PABX has brought you to a dead end, the DEFINITY Communications System can turn your fortunes around.

To find out more about the DEFINITY Communications System, contact your AT&T Account Executive, or call (02) 352 9000 Fax (02) 352 9111.

For PABX technology, it's a breakthrough.



**AT&T**  
The right choice.

AT&T BUSINESS COMMUNICATIONS SYSTEMS AUSTRALIA, 4A LORD STREET, BOTANY 2019.



tial in the system design stage, particularly given the scale at which the world's carriers are providing X.400 services.

With messaging system design at this level, one must also consider the product implementation and distribution characteristics that affect the network. For instance, a User Agent (UA) in Perth can connect via its networked file system over a LAN bridge to the Message Transfer Agent (MTA) in Melbourne. This is more than just considering the logical connections between the UA and MTA messaging functions.

## Business Infrastructure Tool

Companies rely on infrastructure to operate. The infrastructure can be the phone system, quality procedures, the payroll system, the order processing system, etc. Messaging as part of a business infrastructure is not a new concept. Defence organisations around the world have been using and relying on message-based systems for decades. Within business enterprises, however, the move from host-centric systems to lower cost PC/server environments means that a messaging infrastructure can be architected into the business for the business benefit.

Figure 2 is a high level abstract representation of a business with a messaging infrastructure. It shows that user information is formulated around business functions which could have formalised procedures such as quality control, finance and workflow. Information is created, modified, referenced and destroyed in this user space. The figure also shows that information processing can be affected by people's skills and their support environment. Supporting the user/business information environment is the infrastructure of messaging, directory and networking functions to store and transfer the business information.

## System Management

An important aspect of a messaging system design is the tools necessary to manage it. Tools are used for such tasks as auditing, and network management. The management functions of configuration, faults, security, performance and accounting management

are usually needed in the system. But buried in these generic functions is the real need of the organisation to run a reliable service and manage it on the basis of its operational profiles. The system configuration management could cover:

- Network and X.400 configuration parameters for message transfer functions;
- User names, addresses, capabilities, user IDs (billing), security and access capabilities, redirection requirements, etc.;
- Message default parameters;
- Route publication parameters;
- Audit and log file locations;
- Supporting messaging functions and policies (e.g. directory systems); and
- Message text conversion tables.

These configuration parameters could be downloaded to the messaging functions within the network as messages from the management centre. If this is the case the procedures for managing the system would reflect this.

In addition to the management of the technology per se are the administration and auditing of the business procedures which use the messaging infrastructure.

For example, in an EDI scenario, consider the auditing procedures that are needed from the messaging system. Do the actual messages themselves provide an auditing capability or is there a requirement to time stamp messages in separate log files to prove dispatch to other units? Are these log files in fact 'posted' as messages to the 'procedures administration' department via the messaging system? Of course, if management information for the network is transferred as messages then its traffic requirements will have to be considered in the design. Software distribution, message archiving and the transfer audit trails in a busy system will require large and frequent message transfers to the management centre.

## Distributed Architecture

Figure 3 on page 47 shows that in a distributed environment there will be common application level functions, such as messaging and directory services, and that the applications which use these services must be

aware of the naming and addressing scheme for the enterprise.

At the top of the diagram are the end user business-oriented applications such as human resource management, finance, production and the business's quality system. In a distributed environment these will use the file, database, messaging, directory and security services of the common system functions below. The management system function can also perform a local control and management information collection function for both the applications and the common services. Below this application level are the network and communications services which interface to the management system hierarchy.

When designing applications for a distributed environment, its architecture, interfaces, naming and addressing schemes and communications to the functions it interacts with must be built in. This rule must apply in developing an IT infrastructure for the business environment. The naming and addressing for the organisation, people, procedures, document formats, message references, system functions and information objects must be consistent where appropriate. Otherwise the system's measurement and management will be operationally messy.

## Modelling Based on Service

It is not possible to cover all the business aspects of message system design within the scope of a single tutorial. However, network design techniques must seek to embrace traffic modelling based on the services offered to users, typical message/file exchange volumes and sizes, management and business procedural requirements and the instrumentation to audit and diagnose the messaging system. The use of directory systems is fundamental in large scale system design and these will be positioned and characterised from the business needs. Certainly some of these elements are not yet with us, but the evolution toward business-oriented messaging infrastructure networks is certainly occurring through the introduction of OSI and the use of distributed systems.

Alan Lloyd

### *Router Compression from page 35*

handles data compression at the client level, before data is sent over the internetwork.

Several US suppliers, including Fastcomm Communications, Magnalink Communications and Symplex Communication, now offer standalone compression devices. The main advantage of using standalone devices to handle compression is that the router doesn't have to deal with compression at all. Most standalone compression offerings are based on customised hardware, such as chips that can perform compression at higher line rates.

The primary drawback to the standalone approach is the extra cost and the addition of yet another network device to be managed and maintained. Standalone devices also compress header data, which means they are limited to point-to-point links. Vendors of standalone compression devices have taken steps to make their products easier to manage; for example, the Data-mizer IV from Symplex combines data compression with inverse multiplexing, bandwidth-on-demand features, and enhanced data error detection and correction.

Users also are looking into schemes that handle compression in software at the client

level. This approach is getting more attention with the arrival of built-in file compression in DOS 6.0 from Microsoft and NetWare 4.0 from Novell.

DOS 6.0 and NetWare 4.0 also offer decent compression ratios — about 50% with typical files. But handling compression at the client level means relying on end-users to run the compression schemes. Compressing data at the client level means header information will not be compressed. For transmissions involving very small data packets, the effects of data-only compression are less impressive.

Salvatore Salamone



# A world of IT standards at your fingertips

## CCITT and ETSI Catalogues Update Services

**T**wo important new services for all telecommunications professionals wanting to keep up with the latest and revised international Information Technology (IT) standards.

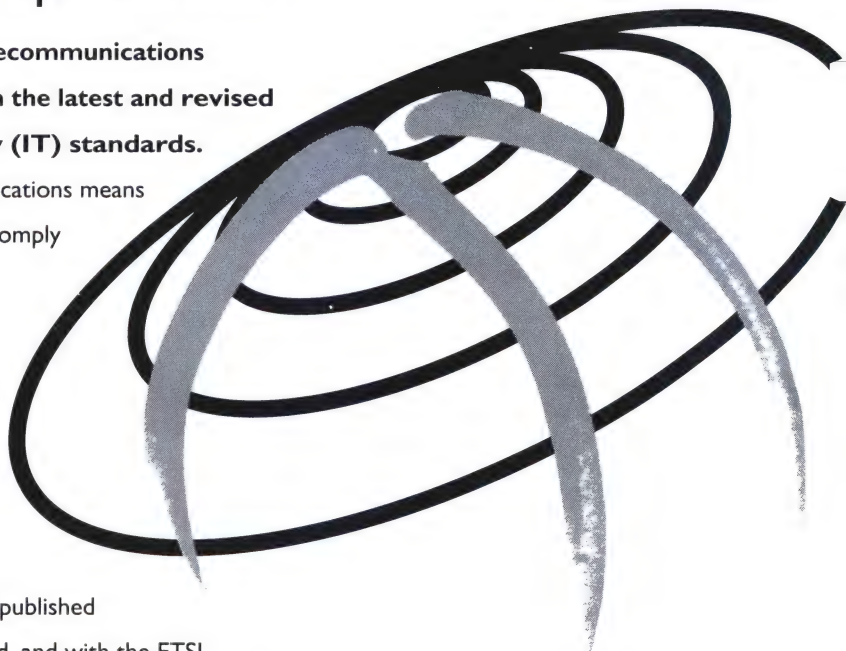
The deregulation of Australian telecommunications means that now, more than ever, the industry has to comply with IT standards from around the world.

Standards Australia is the authorized national distributor of both the CCITT Recommendations and ETSI standards. We offer the most competitive prices and always have the most recently released standards and recommendations.

With the CCITT Recommendations now being published progressively as they are prepared and approved, and with the ETSI standards being constantly revised and added to — our catalogue Update Services provide the most efficient way to keep in touch with the constant changes to IT standards and recommendations.

The CCITT and ETSI catalogues provide you with a listing of all the latest telecommunications standards and recommendations from Europe and around the world. Each Catalogue Update Service provides subscribers with monthly copies of the CCITT or ETSI Catalogues.

For more information on the Catalogue Update Services, simply complete the coupon.



-----

☐ Please send me the CCITT and  
ETSI brochure

Mr/Mrs/Ms .....

Position .....

Organization .....

Address .....

..... Postcode .....

Send to: International Sales Group  
Standards Australia  
PO Box 1055, Strathfield NSW  
Phone (02) 746 4666  
Fax (02) 746 3333

HC0893

**STANDARDS AUSTRALIA**  
✓



# OpenView Signs On

Hewlett-Packard's Operations Centre oversees servers, workstations, and applications.

These days, network management isn't merely a case of finding the right tool for the job. It also means scrambling to keep up with the tools already deployed and staying ahead of the information they collect about network activity and applications. Hewlett-Packard's advice to over-extended net managers is to ditch the running shoes and get things under control with its OpenView Operations Centre.

Operations Centre oversees Unix servers and workstations and coordinates alarms and information gathered by other HP applications and utilities. It offers an unprecedented degree of integration for OpenView applications that are managed from the same console. Until now, users had to open new windows to investigate alarms and take corrective actions — even with applications running on the same workstation and launched from the same main menu.

Several new applications are being offered for Operations Centre. One of these, HP PerfRX for OpenView, gathers historical information about network performance for PerfView, a package that measures CPU utilisation and response time for workstations from HP and Sun. Another, the OpenView Network Licence System, tracks the use of licensed software on Unix networks.

HP has also announced that two key management tools — the Network Advisor protocol analyser and the LANprobe II network monitor — have been integrated into OpenView. This gives net managers their first chance to control remote analysers and monitors from an OpenView console.

## Gathering Intelligence

HP OpenView Operations Centre comprises two basic components: software that resides on a central HP/UX workstation, and intelligent agents that run on servers or workstations under HP/UX, SunOS or AIX. These agents are the first OpenView applications that can monitor remote sites without the need for a fully equipped console.

Each agent gather information about system-wide CPU utilisation, disk space, I/O, and similar operations. Selected data is reported back to the central console using RPCs (remote procedure calls). The agents get their information from Unix log files on the workstations or servers on which they're installed. Network managers can configure the system to examine conditions in those log files or specific events they've defined. The main console furnishes a map that dis-

plays of all the systems in a network that have been equipped with intelligent agents. To do this, the OpenView Operations Centre uses a topology database that was once only available with HP's development tools.

The central console boasts yet another new feature — the Message Browser. This program makes it possible to respond automatically to alarms filed by intelligent agents or other applications. Message Browser also prompts an operator to take specific actions by displaying on-screen messages.

All HP and third-party applications running under Operations Centre appear as icons on its main menu. What's more, all HP and third-party OpenView applications can take advantage of the Message Browser. But applications that are not fully integrated with Operations Centre must rely on SNMP management consoles to send alarms or communicate information.

## OpenView Incorporated

As noted, HP also plans to incorporate a pair of critical management tools into OpenView — Network Advisor and LANprobe II. Network Advisor is a standalone protocol analyser that monitors Token Ring, Ethernet, FDDI, and WAN serial connections; decodes protocols on those links; and uses its integral expert system to advise managers and facilitate troubleshooting. OpenView's Distributed Network Advisor makes it possible to control the analyser from a remote workstation via Ethernet.

The HP LANprobe II network monitor makes use of the SNMP Remote Network

### PRODUCT SUMMARY

**Name:** HP OpenView Operations Centre; HP PerfRX for OpenView; HP OpenView Network Licence System; HP OpenView Distributed Network Advisor; HP OpenView Probe Manager 2.0/LANprobe II

**Description:** Operations Centre manages distributed Unix servers and workstations and keeps tabs on OpenView applications from a central console. PerfRX collects historical information about network performance. Network Licence System tracks the use of licensed software. Network Advisor and Probe Manager/LANprobe II are management tools that have now been integrated into OpenView

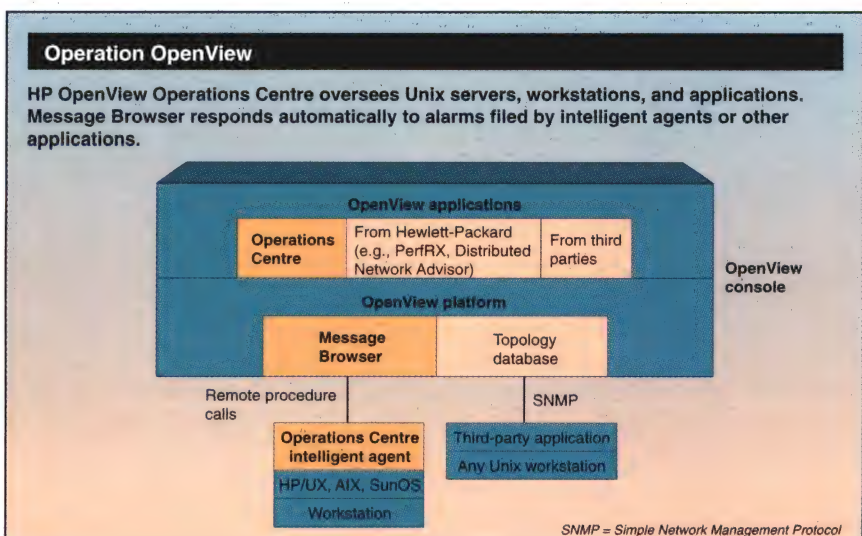
**Price:** HP OpenView Operations Centre from \$22,920 to \$611,225; HP PerfRX \$10,505; HP OpenView Network Licence System from \$9,550 to \$47,750; Distributed Network Advisor \$2,715; Probe Manager 2.0 \$6,975; LANprobe II \$5,251

**Vendor:** Hewlett-Packard, 31-41 Joseph St, Blackburn VIC 3130. Tel: 13 13 47

Monitoring Management Information Base (RMON MIB) to analyse Ethernet traffic. It's used in conjunction with HP OpenView Probe Manager 2.0.

This package also tracks the IP addresses of network devices and reports duplications. Further, it establishes out-of-band connections so each LANprobe II can monitor the situation even if the LAN involved is disabled.

Mary Jander





# Stacking Up With the Best

INC has added a stackable Ethernet hub and SNMP-based management software to its growing product line.

Established only around two years ago, INC Manufacturing is a small Australian company which has managed to establish itself and grow in what is increasingly the 'commodity' end of the networking market. This is one of the harshest marketplaces around — particularly given current worldwide economic conditions — and its success indicates that the company is well managed and responsive to its customer's needs.

The company has been built on a concise range of basic products such as active and passive Token Ring multistation access units (MAUs), lobe extenders and fibre optic repeaters and transceivers for Token Ring networks. INC also makes a variety of products for AS/400 host connection such as twinax concentrators, active stars (UTP, TWX and fibre optic); together with products like 5250 emulation boards for industry standard architecture (ISA) and Micro-Channel bus PCs and a 3270 multiplexer. This unit can also be used as a repeater to provide cable coverage of up to three kilometres between devices.

In addition to having a strong presence in the Token Ring, 3270, AS/400 and 5250 environments INC has a small but complete range of products for Ethernet-based local area networks.

Its Coaxial Connection (10Base-2 and AUI) and UTP Connection (10Base-T) network interface cards, both of which are 8/16-bit ISA cards, are fully compatible with the NE1000 and NE2000 cards.

The company also manufactures local bridges for Ethernet which provide AUI/BNC connection, support the 802.1 spanning tree algorithm and are manageable via the simple network management protocol (SNMP) over both in-band and out-band channels. The Ethernet range is completed with a 10Base-T-to-AUI (pocket size) transceiver and a range of hubs. Until recently, the company offered only 6- and 12- port hubs, of which only the 12 port unit was manageable. INC has now introduced its 412 series of stackable hubs.

## Up to 168 Users

The INC 412XC is the basic unit of the series and is designed for easy rack mounting, as are all other 412 series units. It is a simple repeater which provides 12 10Base-T ports, a single BNC connection for 10Base-2 Ethernet and a single AUI port which can be used for connection of any standard external

Ethernet transceiver. The unit also has two DB50 connections for Bus-In and Bus-Out connection with either other XC units or INC 412M/MC units which permit the basic XC to be managed via SNMP.

Up to 12 INC 412XCs may be stacked in this manner to create an unmanaged repeater with 144 10Base-T ports, 12 BNC ports and 12 AUI ports. That is a total of 168 ports at a cost of just under \$100 per port or, perhaps more realistically, just under \$116 per port if only the 10Base-T ports are considered. Such a repeater could be upgraded to a fully manageable unit with the addition of a single INC 412M — adding just over \$7 per port.

The INC 412M is a pure management module which connects to the 412XC-based repeater via the DB50 Bus-In port on one 412XC unit in the stack. Alternatively, one 412XC in such a repeater stack can be replaced with an 412MC. This unit is functionally a combination of a 412XC and a 412M but does not provide BNC and AUI ports. By using a 412MC and 11 412XCs a manageable hub with 166 ports as described above would cost just over \$106 per port. If only the 10Base-T ports are to be used the cost is just under \$123 per port.

Both the INC 412M and the INC 412MC provide two RS-232 ports for out-of-band management using a PC connected either locally or via modem. In-band management is supported via any of the stack's 10Base-T, BNC or AUI ports. Management is via INC's own INC View management

## PRODUCT SUMMARY

**Name:** INC 412XC, INC 412M, INC 412MC and INC View software

**Description:** 10Base-T Ethernet Stackable Hub (INC 412XC), Manageable version of INC 412XC (the INC 412MC) and the INC 412M Management Module and INC's management software for the 412 series

**Price:** (Ex tax) INC 412XC \$1,390; INC 412MC \$2,400; INC 412M \$1,300; INC View software \$390

**Vendor:** INC Manufacturing, 93 Parraweena Road, Taren Point NSW 2229. Tel: (02) 525-8411

software, which is Microsoft Windows-based, or any SNMP management platform.

The SNMP agent in both the INC 412M and INC 412MC is fully MIB I and II compliant.

At the time of writing this article, INC did not have any private MIB (management information base) extensions — however, work in this area is in progress.

INC's products are simple, solid, standards-compliant, practical and as good as or better than imported equivalents. The company has chosen to make use of national and international distributors (including Anixter Australia, MPA International, Hardie Networks and LAN Systems) to reach local and overseas markets.

**Graeme Le Roux**





# Test Equipment Tele- and Datacom

## Hand-held PCM Monitors - designed for the job...

The EPM 08 (8 and 34 Mbit/s) and EPM 09 (140 Mbit/s) are hand-held instruments for in-service monitoring and demultiplexing of PCM systems.

### Main features:

- Error performance analysis including G.821
- FAS error count and ratio
- Frequency and deviation
- Justification control bits
- Alarm conditions



PCM Monitor EPM 08 and EPM 09

## Testing of the GSM A-bis interface

### Main features:

- GSM A-bis signalling and transmission
- 16 kbit/s subrate access
- G.821
- A-law and GSM RPE LTP voice decoding
- V.24/RS-232C interface



GSM A-bis Meter EGM 35

## In-service monitoring on 2 Mbit/s PCM systems

### Main features:

- CAS and SS#7
- G.821 measurements
- Test on repeaters
- Alarm conditions
- 8-bit in selected channel
- FAS/non-FAS signals
- CRC checksum errors
- HDB3 code violations



PCM Meter EPM 05 Enhanced

## A world of difference - BERT testing on PCM systems

The EPE 06 (2, 8 and 34 Mbit/s) and EPE 07 (140 Mbit/s) hand-held bit error rate testers have all the functions needed to generate and detect bit errors and alarm indication signals on PCM systems.

### Main features:

- Combined pattern generator and error detector
- Bit error count and bit error ratio
- End-to-end and loop-back measurements
- Error performance analysis including G.821



PCM BERT EPE 06 · PCM BERT EPE 07

GN Elmi is represented in more than 60 countries throughout the world



**GN Elmi Australia Pty. Ltd.**  
9 Prospect Street  
Box Hill, Victoria 3128  
Phone: (03) 890 6677

**New Zealand office:**  
Leatham Electronics  
Wellington  
Phone: (04) 385 9409

**Branch office:**  
Level 6, 90 Mount St.  
North Sydney NSW 2060  
Phone: (02) 955 5508

**Phone  
or  
fax  
us now!  
for more  
information**



# Opening the Gate to AppleTalk

Webster's new MultiPort/LT simplifies the connection of Appletalk and Ethernet networks.

Webster Computer Corporation was established in 1970, just a few years after many of the major mainframe vendors established themselves in Australia, as an electronics company specialising in the manufacture of computer-related components. Shortly thereafter, it started to manufacture complete systems based around processors sourced from Digital Equipment Corporation.

By 1984, the company had established an export base. And apart from exporting to Europe and the United States the company now has a domestic client base which represents a cross section of the public and private sectors.

Today, Webster provides a variety of maintenance, training, consulting and research and development services and supplies a range of hardware and software products. Webster's products include: software for PC, Sun, Digital, Apple Macintosh and Unix platforms; ALR Multiprocessor 486 and Pentium-based systems, and PCs. It also designs and manufactures the new MultiPort Gateway.

## Functional Refinements

The original Webster MultiPort Gateway allows the connection of several LocalTalk segments to an Ethernet network and provides full routing between all its ports. Webster has recently announced a new version of the MultiPort, known as the MultiPort/LT, which offers a number of functional refinements and improvements as well as an increase in performance.

Like its predecessor, the MultiPort/LT is a single unit which is, by normal router/gateway standards, ridiculously simple to install and configure. The new unit is configured, managed and restarted via Webster's new MultiPort Manager software.

Multiport Manager is installed on a standard Apple Macintosh and communicates with the MultiPort/LT via the AppleTalk network. This represents quite a significant improvement over the older, Apple HyperCard-based management interface, MGConfig, which required a direct serial connection.

The new software can also manage the older MultiPort units. The MultiPort/LT has an simple network management protocol (SNMP) agent which supports MIB I, MIB II and AppleTalk extensions. Webster plans to introduce a set of private extensions for the LT later in the year.

At the time of writing Webster was not able to supply precise figures for the MultiPort/LT's performance simply because the unit had not yet been submitted for independent testing. While Webster's testing shows significant performance increases over the older unit it's not, to its credit, prepared to publish figures at this stage. However, company officials were happy to provide me with the results of the Harvard Tests performed on the original unit.

These figures show solid overall performance which is at least comparable to that delivered by their overseas based competitors. The test's results are consistent with what I know of the unit's actual performance. Since the tests show that the LT exceeds the older unit's performance Webster should get no customer complaints.

## Near Plug-and-Play

The MultiPort/LT has four LocalTalk ports and a single Ethernet port. There are in fact three Ethernet connections on the unit; one for each of the thick, thin and UTP Ethernet standards. The MultiPort/LT automatically senses which connector is in use and configures itself accordingly.

The unit is built around a DMA architecture using two Zilog Z16C35s and a 68331 CPU running at 16 MHz. Each of the Zilog chips provides a 2-channel SCC and a 4-channel DMA controller. This is actually overkill, since LocalTalk is effectively a half-duplex system, however Webster has installed these chips with future features and functions in mind.

The unit's standard configuration includes either one or two megabytes of random access memory. A total of up to four megabytes of memory is supported and non-volatile FLASH EPROM is used for

## PRODUCT SUMMARY

**Name:** MultiPort/LT Gateway and MultiPort Manager

**Description:** AppleTalk-to-Ethernet router/gateway and its system management software

**Price:** (Ex tax) MultiPort/LT including all software and associated system documentation \$2,995

**Vendor:** Webster Computer Corporation, 1270 Ferntree Gully Road, Scoresby VIC 3179. Tel: (03) 764-1100

the storage of software and configuration information downloaded from the MultiPort Manager software.

The unit supports AppleTalk Phases 1 and 2, TCP/IP, MacIP, IPTalk 1 and 2 and DECNet level 1 routing. Webster plans to introduce support for Apple Remote Access Protocol, Point to Point Protocol (PPP) and the Apple Update-based Routing Protocol later in the year.

The MultiPort/LT provides a simple, cost effective and 100% Australian method of building large Macintosh-only networks based on Ethernet and LocalTalk. It also provides near plug-and-play integration of Apple Macintoshes into existing Ethernet-based networks, and a particularly simple method of giving Macintosh users access to a variety of hosts.

Perhaps the best thing about the MultiPort is that it comes from an Australian-based, Australian-owned company which has been providing service and support on the products it manufactures and sells for over 20 years.

**Graeme Le Roux**





# Information Privacy — Rights and Wrongs

Peter Leonard and Gigi Cheah review the nebulous concept of Information Privacy Rights and how they sit with telecommunications technologies in Australia.

Information Privacy Rights — 'IPRs' — are rights which an individual has in relation to his or her personal information. These rights include the right to control other peoples' access to that information; to require that information only be used for proper purposes; to access that information; to correct any inaccuracies in that information; and to require that information be securely stored.

There is no general right of privacy provided by the Australian Constitution or judge-made law. Instead, Australia protects these information privacy rights by a combination of privacy legislation, guidelines and codes of conduct; freedom of information legislation; criminal legislation relating to 'computer crimes'; and various civil remedies.

The problem is that these laws are finding it difficult to keep pace with recent developments in the fields of IT and telecommunications which, although having the benefit of making it very much quicker and easier to receive, store, exchange and distribute larger volumes of personal information, also make it considerably quicker and easier to infringe on individuals' IPRs.

The law is changing in an attempt to balance the right of the public to make use of such technologies whilst preserving the right of the individual to privacy.

We have previously considered the knotty privacy issues associated with calling number display (CND) services (see August 1992 *Legal Line*). Our focus this month is somewhat wider: how can information about consumers be used and exchanged between corporations? The issue appears most clearly where, for example, non-credit personal information is used for ends which have no commercial justification — for example, the use of video shop rental databases to show that a political candidate has a penchant for blue movies.

In addition, many consumers object to use of other types of information for collateral purposes. For example, is it reasonable for a carrier to use a customer's telecommunications traffic information to identify 'prospects' for cross-marketing of a carrier's other services? Is it reasonable for a service provider (which may or may not be a carrier) to sell customer lists by category of use to third parties. For example, a list of parties with high traffic to Greece

may be of substantial value to a Greek language newspaper. Are a customer's calling patterns 'personal' information justifying privacy protection, or should telecommunications traffic statistics only be treated as confidential if commercially sensitive (for example, of use to competitors)?

If information is commercially sensitive, is that of itself enough to justify limitations on use by third parties who are not competitors? Privacy legislation has so far only scratched the surface of these issues.

## Privacy

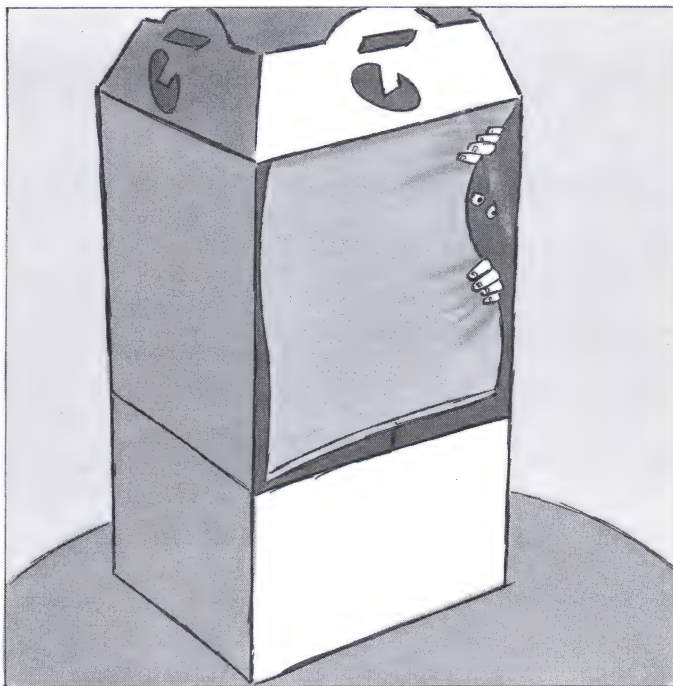
The primary Commonwealth legislation is the *Privacy Act 1988 (Cth)*. This Act applies only to Commonwealth government agencies (with some extended operation to credit reporting agencies and credit providers). It requires these government agencies to comply with the 11 information privacy principles (IPPs) set out in the Act, when collecting, managing and using personal information. Failure to do so constitutes an interference with information privacy and an infringement of the

Act. When collecting personal information, the IPPs require that government agencies only collect such information if it is for a lawful purpose directly related to a function or activity of the government agency and the means of collection are lawful and fair.

Government agencies are also required to inform people from whom they solicit personal information of the purpose of, and the legal authority for, the collection of such information and the identity of any third parties to whom that information will be disclosed. Government agencies must also take reasonable steps to ensure that the personal information is relevant, accurate and does not unreasonably intrude upon the person's personal privacy.

When in the possession of personal information, the IPPs require government agencies to ensure that such information is secure; to allow people to access (and if necessary, correct) their own records (subject to the provisions of Freedom of Information legislation); and to ensure that such information is of good quality, accurate, up-to-date, complete and relevant before using it.

Finally, when releasing or using personal information, the IPPs require government agencies to only use such information for the purposes for which it was collected (for example, information collected for health records cannot later be used in a social security





investigation). The agency may not provide information to third parties unless it has the consent of the person; it is necessary to prevent a serious threat to a person's life or health; it is required by law; or it is reasonably necessary for the enforcement of criminal or revenue laws.

As a corollary to the *Privacy Act*, the provisions of the *Privacy Amendment Act 1990* and the *Data Matching Program (Assistance and Tax) Act 1990* (together with the guidelines and codes of conduct established under those Acts) deal respectively with privacy issues in relation to credit reporting and data matching.

In addition to the Commonwealth *Privacy Act*, a few States have also enacted — albeit in a haphazard fashion — privacy legislation. These include the *Fair Credit Reports Act 1974-75 (SA)*; the *Credit Reporting Act 1978 (Vic)*; and the *Invasion of Privacy Act 1971 (Qld)*. The most successful State initiatives, however, are probably the *Privacy Committee Act 1975 (NSW)* and, in similar terms, the *Privacy Committee Act 1984 (Qld)*, which establish Privacy Committees in, respectively, New South Wales and Queensland. These are responsible for making recommendations on matters regarding the privacy of individuals; investigating complaints about violations of privacy; educating individuals and State Government on privacy issues; and conducting such inquiries and investigations as they consider appropriate.

## Freedom of Information

Freedom of information (FOI) legislation was enacted at Commonwealth level in 1982 and by most States fairly recently (1989-1992). This legislation provides every person with a right of access to certain government documents, subject to certain exemptions; and a right to amend personal information held by government agencies which are incomplete, incorrect, out of date or misleading, subject to certain limitations.

The exemptions to an individual's right of access to government documents is extensive. Broadly, the government documents to which an individual cannot obtain access are those containing trade secrets or information of commercial value; those which would unreasonably disclose personal information of another individual; and those which would, if acquired from a government agency, breach a duty of confidence.

In addition to privacy and freedom of information legislation, certain amendments made to criminal legislation in the 1980's also deal broadly with unauthorised access and misuse of information stored upon computers and unauthorised access of information using telecommunications facilities.

At Commonwealth level, a new Part VIA (entitled 'Offences Relating to Computers') was introduced in 1989 into the *Crimes Act 1914 (Cth)*. These amendments make it an offence to intentionally gain unauthorised access to or destroy data in a Commonwealth computer or Commonwealth data stored on any other computer; to intentionally commit such acts where the public interest is jeopardised; to examine data known to have been obtained through unauthorised means or in circumstances where the public interest is jeopardised; or to gain unauthorised access to or destroy data using Commonwealth telecommunications facilities.

These amendments have also been introduced, in varying degrees, to the penal codes and criminal legislation operating in States and Territories.

In addition to legislation, an individual may also rely on certain civil remedies to protect his or her privacy, including actions for breach of confidence; breach of contract; and various tort remedies.

An action may lie for breach of confidence should personal information be used or disclosed without authority. The elements for a successful action were stated in *Coco-v-A.N. Clark (Engineers) Ltd* [1969] RPC 41. These are first, that the information must be confidential in nature and quality; second that the information must have been disclosed in circumstances importing a duty of confidence; and third, that the information must be used without the authority of the discloser. The problem with relying on this

remedy is that in IT/telecommunications the situation is that information is generally accessed and retrieved by a third party and not 'disclosed in circumstances importing an obligation of confidence.'

An individual may also rely on an action for breach of contract. However, this right of action is subject to two common limitations. First, the courts are often reluctant to enforce confidentiality provisions in a contract if they are too restrictive (for example, if the 'confidential information' has not been defined in the contract with sufficient particularity); and second, a contractual obligation exists only between the discloser of information and the confidant — if a third party gains unauthorised access to the information, the discloser will have no right of actions against that person for breach of contract.

An individual may also consider relying on a tort remedy, such as an action for negligence; trespass; breach of statutory duty; deceit; defamation and inducing a breach of contract. The main limitation however with tort remedies is that they will generally not protect the privacy of the data subject (that is, the individual) but the rights of the body (for example, a government agency) who holds the information.

## Austel Report

Neither existing civil nor legislative methods of protecting information privacy rights are particularly effective when applied to breaches of those rights involving or caused by the use of IT/telecommunications technology. This is because such laws have been developed or tortuously adapted to fit into an environment for which they were not originally created.

Concern regarding this inadequacy prompted Austel to conduct an inquiry into the implications of new telecommunications technologies on IPRs. Its terms of reference included the consideration of how privacy should be protected in light of new technology (such as caller line identification services, automatic calling equipment, voice response systems, telephone information management services, telemarketing and other similar services including unsolicited telephone calls and junk faxes; whether telecommunication privacy issues should be dealt with specifically or in accordance with general privacy considerations; and the importance of privacy considerations in assessing the economic and social impact of telecommunications services.

Austel made a number of recommendations in its report entitled 'Telecommunications Privacy' which was released in December 1992. Most significant were recommendations that the *Privacy Act* be extended so as to enable the Privacy Commissioner to oversee not only Commonwealth government agencies but also State government agencies and private companies; that there be established a Telecommunications Privacy Committee (representing consumers, users, industry and relevant government agencies) to co-regulate, with the Privacy Commissioner, on issues of privacy in the telecommunications industry and to establish a voluntary Telecommunications Industry Privacy Code of Conduct; and that there be appointed a Telecommunications Industry Ombudsman to deal with complaints relating to unsolicited telecommunications. Austel's recommendations cover a number of the more immediate areas of concern and establish a framework for ongoing consultation on further privacy issues as they arise. Important issues remain to be further debated — for example, carrier codes of conduct relating to customer information. Privacy has been slow to emerge as an issue of general public concern. The debate to date has been led by relatively few public interest advocates. This situation is now changing and we expect that privacy will at last emerge as a significant area of debate.

*Gigi Cheah and Peter Leonard practice with the Sydney technology law firm, Gilbert & Tobin, and specialise in telecommunications and information technology contracting and regulation. This column expresses the personal views of the authors, and not the views of any of the clients of their firm.*





# Why the London Stock Exchange chose Ericsson Business Network.

Being able to communicate is of vital importance. Especially when you turn over hundreds of millions of pounds every day. That's why the International Stock Exchange in London installed an Ericsson Business Network.

The Exchange needed a communications system that offered the best in efficiency, reliability and security. Business Network answered all the Exchange's voice and data needs, providing the perfect solution for both now and in the future.

The Exchange's data network uses an Ericsson

ERIPAX packet-switching system. Its administrative telephone system is co-ordinated through an Ericsson MD110 digital PABX.

Right now Ericsson are delivering similar solutions for a large number of Australian companies. If you'd like a free Business Network information kit giving details, call Ericsson.

*business*network

THE COMPLETE COMMUNICATIONS NETWORK

Vic. (03) 480 4888 N.S.W (02) 805 4999 QLD (07) 262 6222 S.A (08) 234 5555 W.A (09) 262 6222 A.C.T (06) 257 1033 Tas (003) 31 2544 P.N.G (675) 25 6566

**ERICSSON**





# Why play games with your communications system



## when there could be a better path to follow...

### ... Q-Net Australia.

For most business users, the current carrier services can present a torturous and sometimes costly path to completion. As a facilities manager we understand the strengths and weaknesses of the Carriers products, the available hardware options and service delivery.

While we compete against the main carriers and hardware vendors, we also use the best that they and others have to offer.

Through our expertise, we are able to offer our clients the best combination of technologies and deliver 15% to

25% savings on their current network costs – with no capital outlay.

If this sounds too good to be true, allow us to conduct a no obligation audit of your current system. We'll prove the benefit of selecting the most appropriate paths to follow.

**Q-NET**  
AUSTRALIA

POINTING YOU IN THE RIGHT DIRECTION

BRISBANE (07) 852 1414 SYDNEY (02) 267 4884 MELBOURNE (03) 526 3506

GCA4817





## Jonathan Parapak

Secretary General, Ministry of  
Tourism, Posts and  
Telecommunications, Indonesia

Jonathan Parapak was appointed in 1991 as Secretary General of the Republic of Indonesia's Ministry of Tourism, Posts and Telecommunications after more than 22 years experience in international telecommunications. He has served as Chairman of the Intelsat Board of Governors (1989-1990), as a member of the ITU High Level Committee (1990-1991) and is currently a member of the board of several companies in Indonesia, including PT Indosat. On graduating from the University of Tasmania as a Master of Engineering Science, he spent several years as an Engineering Officer with Telecom Australia. He is also a graduate of the Indonesian National Institute of Defence. Liz Fell spoke with him at the Ministry offices in Jakarta.

**W**hat does the Indonesian telecoms sector need most?

**Parapak:** Telephone connections, the plain old telephone. In Indonesia, we work on five-year plans. We're now in the final year of the fifth plan and we're very proud of our performance. Why? During our fourth plan, we only added capacity of less than 250,000 line units. Under this fifth plan, we think that by next year we will have added at least another 2.1 million lines, almost ten times more. Because of this performance, we're now establishing a target of at least five million line units during the sixth five-year plan which will start next year.

**AC:** So that is another five million lines by 1999?

# Understanding the Indonesian Opportunity

**Parapak:** Yes. One million per year.

**AC:** Has the sixth economic plan, *Repelita VII*, been published yet?

**Parapak:** It's not yet finalised.

**AC:** A recent ITU publication, *Asia Pacific Telecommunication Indicators*, shows Indonesia behind other ASEAN economies in the ratio of lines per 100.

**Parapak:** If you look at our ratio now, we are reaching one per 100 people. By 1994, the total capacity will be about three million, although the connected numbers may only be about 2.1-2.3 million. So if we are talking about actual working lines, then the ratio would be about 1.2 per 100.

**AC:** Do you find lines per 100 inhabitants a bit misleading as an indicator?

**Parapak:** Yes. In commercial centres such as Jakarta, for example, we could be talking about eight per 100 population.

**AC:** But as well as under-representing urban connections, would you expect every rural household to want a telephone?

**Parapak:** No. That's not our target. We prefer to follow the ITU Maitland Commission report, *The Missing Link*, and talk about accessibility. That's why we're concentrating on public phones and on telephone shops.

**AC:** I understand there are some 67,000 villages. Is the aim to provide each of these with a village telephone?

**Parapak:** In December 1992, we provided all the Kabupaten, the 301 Regency capitals, with automatic facilities. Our target during the next five years is to provide at least 50% of villages with telephone connections, and this could include isolated areas where there is economic activity. For example, Tenpaga-pura in Irian Jaya, where there is a mine, is already connected to the world. A similar situation could develop in Borneo, in Kalimantan or in any other part of Indonesia. We will provide whatever is required.

**AC:** Is the financing of this infrastructure development a problem?

**Parapak:** No. It's not a problem. In any development project it's a challenge, not a

problem. In Indonesia, we work very closely with the World Bank and Asian Development Bank. Right now, around 60% of our capital requirement must be in the foreign exchange component. For the sixth five-year plan, for example, we'll need about \$US7.5 billion, maybe even more if the satellites are included.

To get foreign exchange, we work with the banks, bilaterally with countries, including with Australia in some cases, and with the private sector, though private capital must come in through equity channels. There are also limited commercial borrowing possibilities which are controlled by the Government. But 40% of the funds will be internally generated.

**AC:** I understand that Indonesia is the largest recipient of World Bank finance for telecoms development.

**Parapak:** Yes. And they seem to be very happy about that.

**AC:** It's interesting that about ten years ago the World Bank didn't show too much interest in telecoms funding.

**Parapak:** Exactly. And we have made them interested.

**AC:** Does the World Bank place conditions such as competition and privatisation?

**Parapak:** Not necessarily, though they want to be sure the system will be managed professionally. I've just started to read the latest World Bank report on Indonesia and you're right generally, but not specifically on telecommunications, that the way they look at economic development is through competition. That's OK but, in my view, competition is not the only answer. I think that in Indonesia we believe that a hybrid or middle way is probably better.

**AC:** Do you agree with Australia's duopoly structure approach?

**Parapak:** I think it is good to move into competition through stages. It makes sense to me because that is exactly what we're trying to do in the cellular market in the sense of testing the market and giving time for everyone to learn how to compete. I think that approach makes a lot of sense.



**AC:** What are the major policy issues in allowing private sector participation?

**Parapak:** In Indonesia we have the Law Number 3 of 1989 which has two important elements. One is that we liberalise and privatise value added services but maintain the monopoly of state-owned companies in basic services through Indosat for international and Telkom for domestic. We also provide for private participation through three mechanisms: joint ventures, joint operation or revenue-sharing, and management contracts. So in basic services, a role will be played by the private sector in meeting that target of five million line units.

**AC:** One of your colleagues, Mr Djiwatampu, the first Director of the ITU's Telecommunications Development Bureau, has indicated he wants to expand the role of the private sector in development. Do you agree with that?

**Parapak:** Yes. I ran the campaign for him. But when we talk of the ITU and telecoms development I think we are really concerned about the least developed countries. In Indonesia, we can handle most things ourselves though, of course, we appreciate ITU regional conferences and training and I've told Mr Djiwatampu that that we are even ready to host some of those activities.

But in talking of the least developed countries, it's worth returning to the fundamental issues discussed during the Maitland Commission. The benefits will go back to the richer countries anyway, because they sell equipment and so forth. So why don't they participate in the pioneering work? The concept of universal service obligations must become a global issue.

**AC:** How do you persuade the private sector to deliver universal service to remote areas in the least developed countries if there is no profit to be made?

**Parapak:** It's a difficult issue. That's why it becomes an international diplomacy question and the ITU is playing a role.

**AC:** Meanwhile, the private sector is eager to invest in this country?

**Parapak:** Yes. They are queuing up.

**AC:** And this includes foreign companies?

**Parapak:** Both foreign and domestic.

**AC:** Are there special policies for foreign companies?

**Parapak:** Yes. That works through the Foreign Investment Law. Telecommunications is not on the 'Negative List' any more.

**AC:** Is there a concern about foreign carrier companies taking control of the key infrastructure?

**Parapak:** That is a definite concern and that is why, in masterminding the network, we want to be sure that does not happen.

**AC:** Returning to the three mechanisms you identified for private sector participation, how does joint operation or revenue sharing actually work?

**Parapak:** Let me go back to the fundamental issue that we addressed in the Law Number 3, which was clarified recently in the Government Decree Number 8 of February 1993.

For the provision of basic services, the monopoly is with the state-owned companies and ownership of facilities must be with these companies. In the new Decree, we said that if you establish a joint venture, the right of ownership that must be with a state-owned company will flow through to the joint venture company. That's what happened with the new company, Satelindo, which has Indosat for the international element and Telkom for the domestic element. In other words, by definition, a joint venture has the right of ownership which is very similar to a state-owned company.

**AC:** Can you illustrate how revenue sharing schemes such as Build Operate Transfer (BOT) and Build Transfer Operate (BTO) actually work?

**Parapak:** Indosat was very much like a BTO during the time of ITT [International Telephone & Telegraph], so it's not a new concept. Indosat built the facilities, transferred them to the Government, leased them back for operation by Telkom and then the revenues were shared with ITT. Now to Build Operate Transfer or BOT. Under the new Government Decree No. 8, the private sector can participate in the operations.

**AC:** I'm afraid that I'm still not quite clear on these. In the mobile area, for example, is there a BOT scheme?

**Parapak:** To a certain extent, the existing cellular mobile is really Build Operate Transfer but legally it is not because it's strictly revenue sharing. So it's difficult. What I would expect in future joint operations is that we will mainly concentrate on revenue sharing so that investors can participate in the financing, purchasing, installation, operation, maintenance and maybe even the marketing.

**AC:** So does this apply to Satelindo [PT Satelit Palapa Indonesia], which will operate the new Palapa-C satellites?

**Parapak:** Yes. Satelindo is a joint venture company and is free to operate its own satellites now.

**AC:** What is the actual relationship between Satelindo's private and state-owned shareholders?

**Parapak:** Telkom has 30% and Indosat has 10% so 40% is owned by the Government, and they are represented on the executive board of directors and on the board of supervisors. The Government will determine the technology, regulatory aspects and so forth.

**AC:** Does PT Pasific Satelit Nusantara [PSN], which operates the old Palapa B1 in the Pacific, involve a similar relationship?

**Parapak:** Similar, but not the same. Why? Because PSN right now is only operating overseas.

**AC:** So it doesn't uplink from Indonesia?

**Parapak:** No.

**AC:** Where are its uplinks?

**Parapak:** It interconnects Taiwan and the Philippines, I think.

**AC:** Am I correct that another Indonesian satellite system being planned is Media-Citra Indostar for direct broadcast television and radio?

**Parapak:** That is still a conceptual system. We've been studying it and so forth, but the joint venture company is not formed yet.

**AC:** So it's not definite that Indostar will go ahead?

**Parapak:** I would say that it's pretty sure, but it's a process that is still not complete.

**AC:** Those three ventures add up to a lot of Indonesian satellite capacity. Is Indostar attractive because it will involve 'lightsat' technology?

**Parapak:** It is a good technology to reach isolated areas. We have been ahead of other countries in using domestic satellites, so why not? We can be ahead again in the use of lightsat technology.

**AC:** It would seem that the World Bank isn't necessarily in favour of Indonesia embarking on new high tech ventures.

**Parapak:** Indostar is a private venture.

**AC:** But won't the Government have a shareholding through Telkom, for instance?

**Parapak:** I don't think that there will be too much participation. The majority will be private.

**AC:** Is the Palapa satellite system the major way to reach remote areas?

**Parapak:** In the past, people immediately started thinking of the satellite for voice communications. But now there are cellular systems. We have cellular service in 14 towns where there is a message switching centre. Once you extend the infrastructure, of course, you can then service the villages such as those between Jakarta and Bandung.

**AC:** Are you planning to introduce digital cellular?

**Parapak:** Yes. We are going to move to GSM. Right now we have the AMPS analogue which is supposed to be national and it may also migrate to digital.

**AC:** Will that be a national GSM service?

**Parapak:** Yes, provided by Satelindo.



**AC:** *Where does that leave PT Telkom and PT Indosat?*

**Parapak:** They're all in Satelindo, you see.

**AC:** *How will the GSM switching equipment supplier be selected?*

**Parapak:** That will be selected by Satelindo.

**AC:** *Will you be behind the scenes giving advice?*

**Parapak:** Not only behind the scenes, but right at the head of the table.

**AC:** *Are you on the PT Satelindo board?*

**Parapak:** No. But I chair a lot of different things!

**AC:** *When do you expect the GSM service to be operating in Jakarta, for instance?*

**Parapak:** Next year.

**AC:** *Is PT Satelindo becoming Indonesia's second telecoms carrier?*

**Parapak:** Yes. It is a second carrier because it will operate the satellite for international and domestic and cellular.

**AC:** *Will you restrict it to operating these technologies?*

**Parapak:** Yes. At the moment. Basically the concept is radiocommunications, satellite and cellular.

**AC:** *I notice that Satelindo's Palapa C satellites can cover the east coast of Australia.*

**Parapak:** That is a steerable antenna so it could be swung all over the place when needed. That is technology addressed to the marketplace.

**AC:** *It's interesting given that the Australian Government rejected the opportunity to extend Aussat into Asia.*

**Parapak:** They could have done that. If you look at Palapa B, it's covering as far as India and Iran, I think. At the same time, we have other satellites covering us.

**AC:** *Yes. I've never seen so many large TV satellite dishes as I have in Jakarta. Returning to major policy trends, is the Government planning to set up a separate or independent regulatory body?*

**Parapak:** No. It is the structure of our Government that we don't have independent bodies. They are part of the Government. I understand that it's quite customary in Australia to have a body like Austel, and also in the UK, they have OfTel.

But in Indonesia, we don't work with an independent regime like that. The Japanese don't work that way. The French don't work that way. Maybe we are sort of in between.

**AC:** *Are there tensions between the Indonesian Government's ownership of Telkom or Indosat and decisions to introduce competition?*

**Parapak:** In any decision, you have to consider the pros and cons whether there is a tension or not. It's all relative.

**AC:** *Could you outline the role played by your Ministry and its relationship to other Ministries such as Finance and Planning.*

**Parapak:** The Director General really works within the Ministry. He has responsibility for regulatory, operational and technical matters. It is different in some countries where the Director General is independent, but that is not the case here. Everything he does is for, and on behalf of, the Ministry. If we talk about general policy, technology and so forth, my job is to coordinate areas such as the Research and Technology Department, Finance and Planning, and then put the result on the table for the Minister.

**AC:** *Does your policy role encompass international and regional bodies such as the GATT or the Telecommunications Working Group within APEC?*

**Parapak:** Yes. I pay attention to policy issues coming up in GATT negotiations, in APEC, Intelsat, Inmarsat, ITU and so forth.

---

*"The concept of universal service obligations must become a global issue."*

---

**AC:** *Do you see the APEC Working Group as important for regional cooperation?*

**Parapak:** It's interesting, though I'm not sure we would expect too much out of APEC in telecommunications. There are excellent working relationships between countries already. For example, I have many friends in OTC and in Singapore Telecom.

**AC:** *With your experience in Intelsat as a former Chairman of the Board, how do you see its future?*

**Parapak:** It is a big move to allow Intelsat to borrow money rather than being tied up in relation to signatories and parties. Another major move is the review of Article XIV [relating to separate satellite systems]. I think that Intelsat is going to become an independent organisation that can really provide competitive services in some areas.

**AC:** *If Intelsat begins to market its own space services in competition with national satellite companies, won't this create some tensions?*

**Parapak:** Yes. But that's the way the world is changing.

**AC:** *What is happening in Batam where there was to be a joint venture involving, I think, the Salim Group, Singapore Telecom and PT Telkom?*

**Parapak:** That has not really taken off. People were expecting something, but I was not really enthusiastic because I knew that could have been done cheaper. I think they're going back to that now. We are trying to settle the arrangements there. There's a gateway connection to Singapore but it can also go to other places. If they want to establish a joint venture in the domestic area, there is no problem. It is a separate island.

**AC:** *Turning to equipment manufacture, would you agree that the state-funded PT Inti has been very successful?*

**Parapak:** Yes. I like to think that. I hope it will continue that way. But it could do better in making things cheaper. Now I am on the buying side, I have to talk that way! In the major switching area, it is now facing competition from both AT&T and NEC.

**AC:** *Is there a place for Australian manufacturers?*

**Parapak:** My personal view is that Australia will probably enter through the route of software development, where it is very strong.

**AC:** *Do you see Telstra as having a role to play in the Asia Pacific?*

**Parapak:** Telstra have proven themselves already in Vietnam, Laos and, with Indosat and Telkom, they're in Cambodia with the UN network. Really, we think of Australia in terms of a partnership.

**AC:** *But isn't Telstra looking at entering this market?*

**Parapak:** Yes. I think they would like to get into other services such as trunked radio. That is available to the private sector in a joint venture. I think everyone has a long-term vision that by the year 2010 or 2020, world communications will truly become one. So carriers from the liberalised countries are getting a foot in now. I won't be around, but who knows? Privatisation may even take place here by the year 2000!

**AC:** *You mean that Telkom and Indosat may be privatised?*

**Parapak:** In the future if the environment is right and the people want it, why not?

**AC:** *If Australian companies want to enter this market, what lesson should they learn or is there some advice you could offer?*

**Parapak:** When one of our Ministers came and then met my Minister, he gave a long talk and said that: 'If you want to work with Indonesians, you must first touch their hearts.' I guess in Australia, that is seen as unusual. You have to recognise that people are different. Once you touch their hearts, you are accepted as one of them and you can get into business.

*Liz Fell is a freelance journalist based in Melbourne.*





Tom Amos

# Counting the Content Cost

**L**ate last year there was a furtive move by Telecom to enter the content business by the development of an association with the Packer and Murdoch organisations — this 'PMT' venture was created to address the potential new markets of Pay TV, interactive video and shopping, and software distribution. It was reported at the time that the new venture was to marry the commercial television software with the distribution technologies of Telecom to create a Pay TV company that was outside the gaze of the TPC, the *Broadcasting Services Act*, the Government's censorship laws, and whatever other Act you might care to think of. Dial-up viewing was one scenario, along with the introduction of wideband cellular-like radio television services using compressed digital transmission formats to deliver high quality Pay TV without a satellite.

Time has moved on, and now another new content venture has been added to the growing list of Telecom acquisitions, in an apparent grab for new markets that could be made complementary to the basic monopoly infrastructure business. The reported purchase of a 10% shareholding in the Seven Network has far-reaching implications for the telecommunications industry as it signals, without consultation or reference to the industry framework, the introduction of a content component to the Telecom business prior to the fastest bureaucrats in Australia, Austel, actually calculating what is cost-based and what is not. Telecom assumes that it is in a position to expand into different businesses at the expense of the telecommunications industry, and if it fails to make money, like it has for some years overseas, then we all pay twice — once for the investment, and again via increased charges (or should I say no reductions) in the monopoly service areas.

Telecom was unleashed in order to be more efficient in the provision of telecommunication services, not to become a television mogul or a purveyor of information and entertainment services. The whole idea of now four semi-Government owned television services, the ABC, SBS, Telecom/PM and Channel 7 is, to say the least, absurd. The telecommunications industry under microeconomic reform is being restructured to be more cost aligned and operate in a pro-competitive framework. The vertical integration of services into the carriage transport system is the complete reverse of this reform, and smacks of middle '80's US antitrust-like thinking, where the carrier used its regulated income to lever into the information technology businesses and become the indispensable fabric of the modern society. But in the US at least the companies have stockholders, and they do not compete in the local loop area.

The Telecom move has the potential to restrict the continued opening of the marketplace by having a supplier/owner and price setter with seven million deals competing with those who would only supply software or potentially infrastructure — an information rich/poor scenario that would seem to be at complete odds with the reason the old Telecom and OTC were merged.

The separation and the development of the Austel chart of accounts/cost allocation manual (COA/CAM) may never be finish-

ed if the bundling continues with the introduction of new multimedia package services. Of course, who actually pays will always be the question, as it will be a little difficult to determine whether the vertical service components are correctly priced.

For example, in a packaged video BCS home service where is the profit to be taken? It can be in the application software, the transmission system, the switching system, or in the recurring maintenance. Depending on the competition, the view of the provider could be skewed towards the areas of least competition to maximise the return on the total service. This has the effect of denying equal access to other competitor services if they, in turn must purchase a component of the dominant system to deliver their product.

It also affects other users of similar services that do not deliver the same end-to-end product, as they may be forced to pay above the cost-related price due to the distortion in the packaged video BCS. The same old story of pre-reform cross-subsidy is potentially returning in all its glory. It all gives a new meaning to the concept of a natural monopoly.

And what of the user? Bundling of content services into new BCS-based services will promote even less understanding of what constitutes a service, with higher overall cost and no ability to predict the outcome. The entry into the application services market by Telecom will require funding from somewhere, and the users will ultimately be required to provide this funding.

It seems logical that if the Government wishes to enter the Pay TV business it should use one of its current vehicles rather than one that is not in the business. This is the big difference between Australia and the US, where until recently the major carriers were forbidden from owning such services due to concerns over market dominance. The owner of Telecom is already in the business, and unlike the US, Australia has little or no rules in this unregulated area. Maybe this is also an attraction?

The desire to avoid the recabling costs for Australia by cross-subsidising this from entertainment could only come from Fantasy Land. If there is to be only one pipe to a home, then this pipe needs to be eventually cost-related. The situation of one service cross-subsidising another so as to perpetuate a monopoly position is far from the best for the long-term health of telecommunications in Australia but seems an almost inevitable outcome of Telecom's media move.

In Australia it seems the perception that you're not making money unless you do it with the Government still holds true. The cost of allowing the bundling of the content of the telephone call could cost the user community dearly in terms of less cost-related pricing and increasing cross-subsidy. If the desire is to have the new wideband infrastructure not Government-monopoly provided, then the best effective use of community resources is the competitive model that is just a few years away . . . not another monopoly.

*Tom Amos is a partner with telecommunications consulting engineers Amos Aked Swift.*





*Bill Melody*

# The Ballot — Telecommunication Beauty Contest

**M**icroeconomic reform in the telecommunication industry has been directed to increasing efficiency, improving service, reducing prices and expanding consumer choice. Vigorous competition that rewards suppliers who meet these goals is a time-honoured means of achieving them.

However, competition is not an end in itself. Competition can get directed toward inappropriate goals that conflict with efficiency and consumer choice. The TPC sets limits on certain kinds of competitive behaviour, such as misleading consumers and restricting market access. Austel promotes desirable telecommunications competition between Telecom and Optus.

Studies of duopoly competition over the years have shown it to be generally weak and ineffective, as illustrated by the first decade of telecommunication competition in the UK. Australia took strong steps to ensure its duopoly competition is more effective in the early years. The primary vehicle for promoting it is the Optus interconnection arrangements. Australia has provided the most generous conditions of market access to a second carrier of any country. Optus has full interconnection rights at very low prices during its establishment phase. Consumers can access Optus service on a call-by-call basis, simply by dialling '1.' Within this policy framework, we might inquire how the ballot will affect industry efficiency, consumer choice and competition.

The purpose of the ballot is to allow consumers to preselect Optus as their basic long distance carrier without dialling '1.' The simplest method — used frequently by US regulatory agencies — would be an insert in subscribers' bills informing them of the new choice, and how to exercise it. This could be supplemented by a public education campaign. Optus, of course, would highlight the new choice in its marketing directed toward those types of customers it wants to attract. This is an easily understood and inexpensive solution. The only additional costs are the bill insert, which can be continued as long as desired, and the public education campaign.

By adopting a special ballot, a greater proportion of subscribers will have their attention brought to the issue of competition sooner. Being asked to choose a carrier is a more direct request than being informed one can change basic carriers, although the decision for consumers is the same. The ballot will lead to a shift of subscribers to Optus, and punters are busy estimating how many. But no estimate has been made of the additional number of subscribers likely to be affected, over and above the simple approach suggested above, and whether the benefits justify the enormous costs.

As Optus' growth in market share is exceeding its forecasts, there is no need to seek new ways to implement the government's competition policy. A large proportion of subscribers, including all business and most high volume residential, can readily program '1' into their PABXs and automatic diallers now. Businesses with least-cost routing now exercise superior choice than the ballot will provide.

A low turnout is expected, thus requiring a second ballot. For consumers who already understand the choice and have done their

analyses, the ballot is unnecessary. For those selecting Telecom a response is unnecessary. One reason for the low response rate will be because many subscribers are more confused than informed about which choice will be in their best interest. There is no way they will have sufficient information to make an informed commercial choice without consideration of calling patterns and tariff structures that will not be made available. The public education campaign won't help them choose, and the carrier advertising hype will be encouraging an emotional, not a rational choice. It is not a real market choice. Nothing is being purchased. It is a beauty contest!

When the ballot is completed, subscribers will have to dial four digits to exercise call-by-call choice instead of one, and different digits for each alternative carrier. This makes choice more complicated, and will reduce real choice for a segment of the market. It is argued such a change will be necessary for the 1997 transition to competition with more than two carriers. But this is hardly a reason to deny consumers more than three years of a better system. Moreover, by 1997 automatic dialling will have penetrated virtually the entire market, mooted the digit issue. If the experience of other countries is any guide, Australia is not likely to be overrun by new public service telecommunications carriers in 1997.

It should also be recognised that the circumstances of the US ballot were very different. After the breakup of AT&T, there were several competing long-distance carriers connecting to different local exchange monopolies. The technology of the time required the dialling of up to 12 extra digits to use an alternative carrier. Most significantly, the local monopoly was required to hand over long distance calls to one of the competitive long distance carriers. The US ballot was required by the AT&T divestiture of the local telcos.

The cost of the ballot is outrageously high. Administrative costs of \$30 million; special beauty contest promotional campaigns by the carriers of an even greater amount; public education campaigns that are likely to exceed \$30 million before the national ballot process is finished. Different rules will apply to different locations over the next several years. To what end? It does not promote efficiency, improve service, reduce prices or improve consumer choice. It will increase Optus' market share in the short run, but won't make competition more effective. The ballot process has redirected the focus of competition away from efficiency and informed consumer choices. A common characteristic of duopoly inefficiency is directing competitive efforts to creating artificial service differentiations through advertising, rather than to efficiency and real consumer choice. Spending additional large amounts on administering competition, by asking subscribers to pick their favourite carrier in a ballot, is a further diversion from the real goal. Together they are an enormous waste of resources arising from misdirected competition and regulation. The ballot should be reconsidered.

*Bill Melody is Director of the Centre for International Research on Communication and Information Technologies (CIRCIT), Melbourne.*



# Now available in red.

Now you can get the leading integrated solutions in the most popular networking color. Novell® red. Because SynOptics products are now tightly integrated into the Novell NetWare® environment, including the NetWare Management System™ (NMS).

*Optivity™ for NMS™ means easier management of Novell® NetWare® networks.*

With network management solutions like our Optivity™ for NMS,™ you get an expanded view of your network, plus access to other NMS services. And SynOptics' Lattis EZ-View™ software, ideal for smaller networks, has Novell IPX support.

SynOptics intelligent hub products—whether Ethernet or Token Ring—are easily integrated into Novell NetWare environments. And because they're bilingual, they can be managed through SNMP over IP or IPX. So now you can build a flexible network that will grow as you do.



By supplying the solutions you need, SynOptics is helping you build the foundation for a strong network fabric—the underlying structure that connects and manages your network. It provides high-speed network communications. And it's flexible enough to grow as your network does, without sacrificing your existing investment.

To learn more about SynOptics' Optivity for NMS solution, call Australia 008 81 7070 or New Zealand 0800 44 7070. And see just how good we look in red.

Please send me more information about SynOptics' Optivity for NMS solution. 

Name \_\_\_\_\_ Title \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Company \_\_\_\_\_

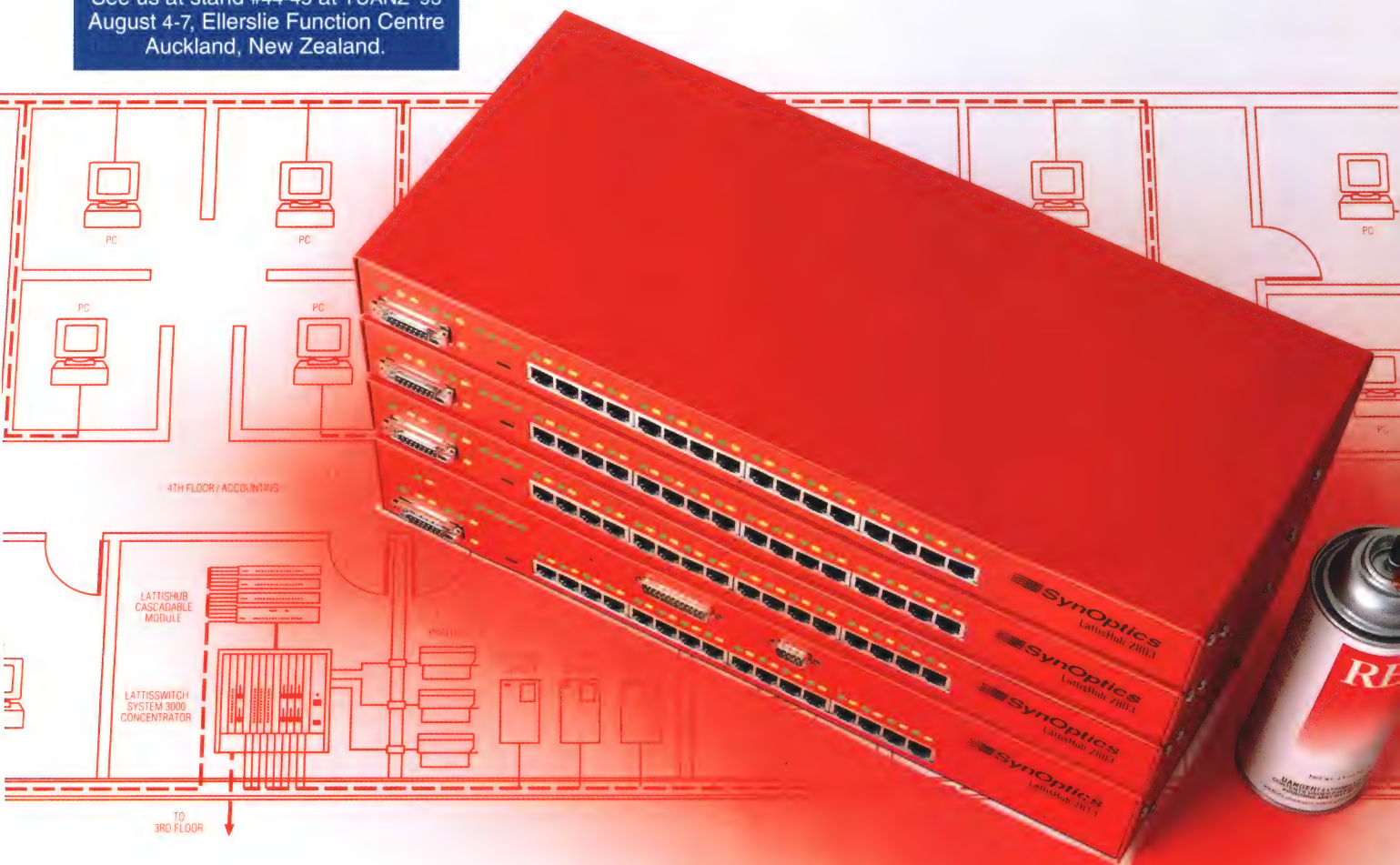
Address \_\_\_\_\_

Send to: SynOptics Communications Australia Pty Ltd., SynOptics House, Units 2&3, 79-83 High Street, KEW VICTORIA, AUSTRALIA 3101. Or fax us on: (03) 853 0473 or (613) 853 0473. SYN PC AC AUG93

## SynOptics

The Network Fabric of Computing

See us at stand #44-45 at TUANZ '93  
August 4-7, Ellerslie Function Centre  
Auckland, New Zealand.





# Single Station Net Management: Fact and Fallacy

Vendor hype aside, the management of a large, heterogeneous network from a single station is problematic if not impossible. Graeme Le Roux explains why.

By now every network administrator has been bombarded by publicity of one form or another about the advanced management capabilities of every piece of network product available; from hubs, bridges and routers to network operating systems and applications packages. We have all been treated to slick presentations where maps of a WAN have been clicked upon to reveal LAN diagrams at a given location, which in turn have been clicked upon to reveal real-time colour status diagrams of each box on the LAN, which in turn has led to a demonstration of how said boxes can be reconfigured instantly without moving more than arm's length from our coffee mug.

The problem is that setting up network management is not that simple, nor is it always possible to unify the functions of management found in any large network. SNMP (the Simple Network Management Protocol), for example, is great for hubs and routers, but what about communications gear such as ISDN termination equipment? What about your hosts, servers, workstations and the applications they run? Do you need that level of management? Just when do you need management? Just what is *management* anyway?

## What is a Typical Network?

Before any of these questions can be answered it's instructive to look at just what makes up a typical, heterogeneous corporate network, and the way in which it has grown. The network of Company A (shown in Figure 1 on page 67) is an example of the sort of network found in many of the larger corporations. Most of these systems started out as a pure SNA EDP operation with a completely separate telephone system. The SNA host at Site One came first, with 3270-type terminals connected via twinax. These terminals were replaced with PCs equipped with emulation cards.

Generally at about this time in the corporation's history somebody bought a small PC-based LAN, generally against the wishes of the corporate EDP establishment. This LAN probably ran on thin Ethernet (often using low grade RG58 type cable rather than something which meets full 10Base-2 standards). The workstations on this LAN probably still had twinax connections because the EDP establishment refused to have anything to do with the PC-based gateways of the time — often with very good reason. Not to be outdone, the traditional establishment probably installed a Token Ring network around the same time, since it was 'faster' and 'more reliable' than Ethernet and considerably cheaper than more twinax.

Meanwhile, Ethernet was probably appearing at Sites Two and Three. Shortly thereafter e-mail began to appear via dial-up



modems. This generally happened with the blessing of the EDP establishment because applications like e-mail tended to have a significant impact on the performance of SNA hosts, which were primarily used for transaction-oriented database applications.

Eventually a bridge usually got installed between the Token Ring and Ethernet LANs and, due to its lower cost, the Ethernet was extended using 10Base-5 as a backbone and 10Base-T to the desktop. This also eliminated the unreliable pseudo-10Base-2 coax.



## SunNet Manager: The Management Benchmark

Sun Microsystems' SunNet Manager is probably the best supported management platform on the market today. It is also one of the most powerful. As a result, it is often the platform of choice for slick management presentations. While the product is known as an SNMP management platform it is actually based on Sun's RPC (Remote Procedure Call) protocol and the use of SNMP proxy agents (see 'An Overview of SNMP,' on page 68). This allows distribution of management functions across a network and the integration of equipment using virtually any standard or proprietary management protocol into the SunNet Manager environment as well as minimising, or at least localising management traffic on a network.

For example, consider the network shown in Figure A. At Site B there are three terminal servers, each of which is capable of supplying traffic statistics via SNMP. The host that the terminals at both sites use is housed at Site A. The two sites, having only terminal and host printer traffic are linked by a relatively low bandwidth WAN link. If the network manager at Site A wanted to compare the relative throughput of each of the terminal servers at Site B via SNMP, the management console would have to poll each of the servers continuously across the WAN link. This would almost certainly degrade the network's performance.

However, by placing a proxy agent at Site B to gather statistics and periodically transfer them to the management console via RPC the WAN bandwidth is conserved, since SNMP traffic is confined to the Site B backbone. Figure B illustrates this mechanism. There is also a proxy agent at Site A, however it resides in the management console. The proxy agent at Site B might reside on a specially installed Sun Sparcstation (which may also be the router). The Unreliable Datagram Protocol (UDP) is used to transport SNMP and RPC packets.

Notice that if some or all of the SNMP stacks in the various devices on the network are replaced by, for example, CMIP stacks, only the proxy agents need be replaced, and presumably a new MIB would have to be compiled, but little or no alteration to the SunNet Manager software is required. This is precisely the mechanism

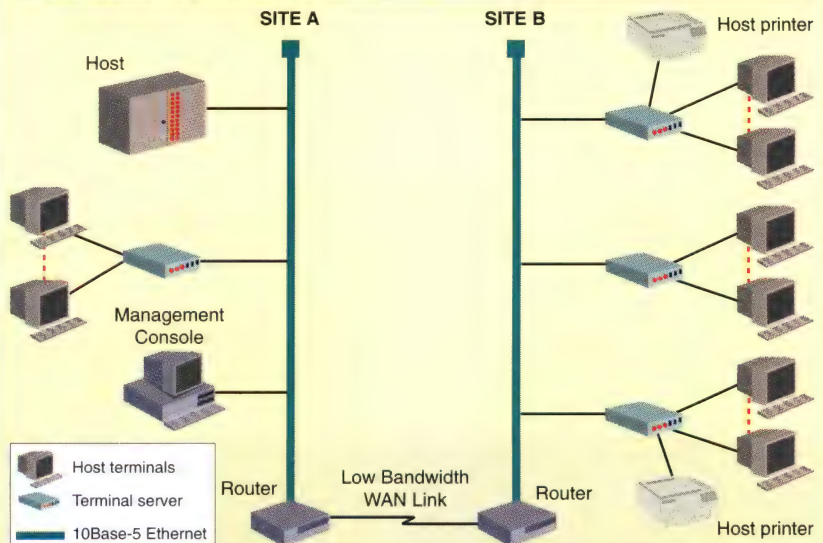
which Sun's SunConnect range of products uses to integrate management capabilities for DECnet, NetView and other environments into the base product.

Sun supplies SunNet Manager as a base product with a variety of tools for applications as diverse as customising interfaces through automating management

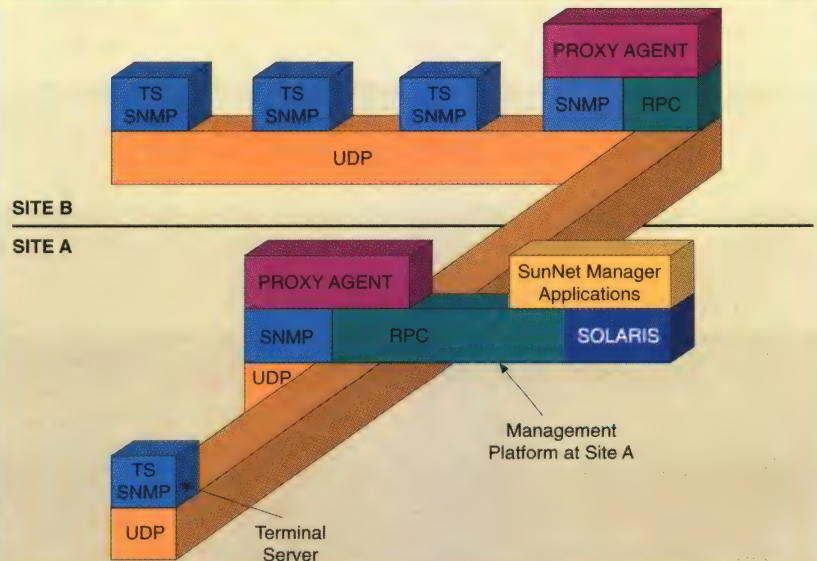
functions; analysis and presentation of network data; and searching your network for devices to manage. Add-on modules from Sun and other vendors add additional capabilities for everything from managing other vendors' hardware to creating and implementing your own SNMP agents.

**Graeme Le Roux**

**FIGURE A: THE MANAGEMENT BOTTLENECK**



**FIGURE B: MANAGEMENT BY PROXY**



Finally, the bandwidth of the dial-up links became woefully inadequate, while at the same time the cost of tie-lines between PABXs, not to mention the cost of leased lines for the mainframe, was rising.

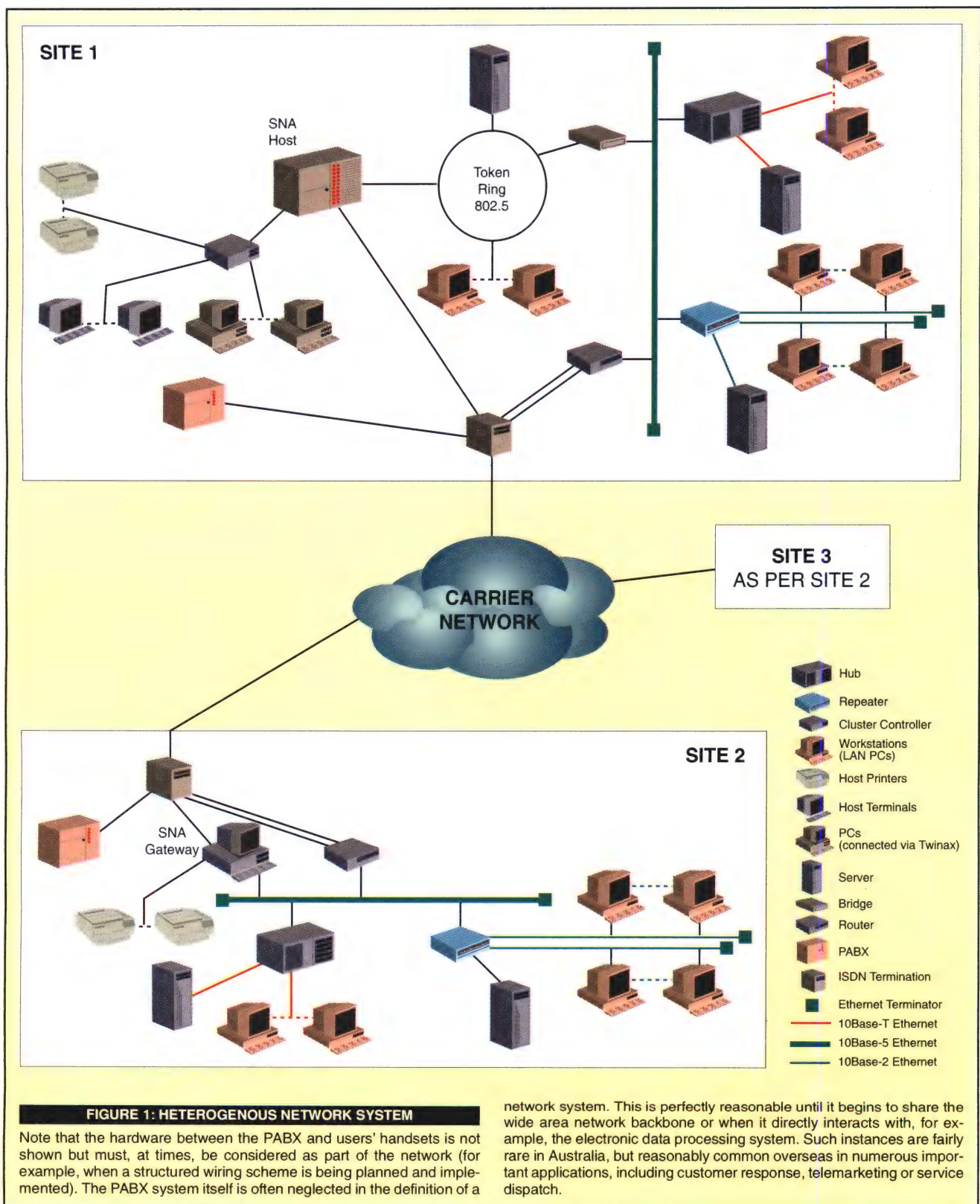
Eventually the company looked at minimising these individual costs, and increasingly Primary Rate ISDN was implemented to

carry all EDP data and voice traffic between the three sites. The 'PC network,' which was by now as important to the company's operations as the EDP system, (although usually not so acknowledged by management) was able to 'share' some 'surplus' bandwidth. By now the cluster controllers at Sites Two and Three have almost certainly been replaced

with gateways to the network and any remaining terminals removed. In fact, the most common reason for the installation of an SNA gateway is to eliminate expensive twinax, twinax terminals and twinax connections to PC terminal emulation cards.

So now the company has a large, heterogeneous system. Obviously it needs 'man-





agement' — but of what? How feasible is it anyway? Can you really sit at one 'management station' and play God-of-the-network as the slick point-and-click demonstrations would have you believe? The answer is yes, and no . . .

First of all, this heterogeneous network actually consists of several homogenous

systems — in this case, five distinct systems, as shown in Figures 2a through 2e. Each of these has a different management interface. In fact, it is these different interfaces and what is visible to them which define each individual network system.

System management in each case consists of three inter-related operations — the

monitoring of the system's current state; manipulating its state; and the acquisition of data about its state for future analysis. Network management can be defined as the management of all systems in the network. Since the management interfaces of each of

*Continued on page 70*



## An Overview of SNMP

The Simple Network Management Protocol (SNMP) is rather like a game of chess: the capabilities of each individual piece are very simple and quite straightforward but the game itself can have almost infinite complexity and contain pitfalls for the unwary.

SNMP is one of the best examples of a client-server application currently in use. In an SNMP environment the client is called a *manager* while the server is referred to as an *agent*. An SNMP agent is a piece of software which generally resides on the platform being managed — a bridge or router for example — which is referred to as an *entity agent*. A common exception to this is where the agent is actually performing a protocol translation between SNMP and some other management protocol in order to manage a remote non-SNMP capable device. Agents which perform such protocol translations are referred to as *proxy agents*.

Any device on a network which is to be managed must have an agent associated with it. It must also have one or more manageable objects which may be addressed via their individual object identifiers. These objects may be such things as the port status on a hub or router, the number bytes received or transmitted, or a route table.

Functionally, SNMP agents are reasonably simple. They are capable of responding to requests made by managers regarding the current status of an object (via `get_request` or `get_next_request` messages), altering that status in response to a manager's instructions (via `set_request` messages) and notifying a manager of a specific event of which a manager had requested notification (for example, an error counter exceeding a given threshold). This latter function is accomplished via the trap message which is the only message that an SNMP agent can initiate.

Because they are so simple, SNMP agents require very little of an entity agent's resources, but unfortunately this means that SNMP managers have to poll agents to find out what is happening on the network.

To obtain those slick real-time graphical representations of network usage a manager has to send `get_request` messages to several agents once every few seconds. If the site you are trying to monitor is on the other side of a low bandwidth WAN link it is not too difficult to significantly reduce network response. As a result of this, most network management software makes use of proxy agents to provide transport between strategic points on the network and a network man-

agement console (see 'SunNet Manager: The Management Benchmark,' on page 66 for an example).

The SNMP object identifiers are described in Abstract Syntax Notation One (ASN.1) and are encoded as messages between managers and agents using Basic Encoding Rules (BER). Object identifiers are also referred to as Management Information Base (MIB) variables.

A MIB is a hierarchical structure which defines which variables a compliant agent must provide. The definition of this structure is detailed in RFC (Request For Comment) number 1155: 'The Structure of Management Information (SMI).'

A MIB is an SMI sub-tree, a path from the root of such a tree to a node is an object identifier.

SNMP's base MIBs (MIB-I and MIB-II) are not the root of the SMI tree. The full reference to the SNMP MIB root is (using ASN.1): `iso.org.dod.internet.mgmt.mib`.

There are actually four branches under `.internet`, three of which are directly relevant to SNMP. These are `.mgmt`, `.experimental` and `.private`. In theory, the experimental branch is for such applications as testing future extensions to the standard MIBs found under `.mgmt`. It is in this branch that MIB extensions described in draft RFCs should be found. The `.private` branch defines vendor specific MIBs, e.g. `.internet.private.enterprises.cisco`.

This branch contains all the proprietary extensions for Cisco products. For a management software package to fully support Cisco's products it would therefore need to comply with at least MIB-I, MIB-II and Cisco's extensions. Typically a vendor, like Cisco, will supply its extensions in a form which can be 'bolted' on to any software package which it chooses to support and build support for all objects under the `.mgmt` sub-tree into its agents. The vendors of most management software packages build support for everything under the `.mgmt` sub-tree into their base software.

Theoretically, adding a given vendor's extensions to your management software package is as simple as running a MIB compiler on the vendor's MIB and putting the correct file(s) in the correct directory(s). A MIB compiler is, as the name suggests, a program which will take a source MIB written in a standard form from one vendor and turn it into a database file that the management software from another vendor can read.

Unfortunately things are not always that simple. As with many programming languages it is perfectly possible to write a private MIB source in standard form

which a given compiler cannot read or can't compile. If this happens you may have to reorganise the source MIB objects into something which the compiler can read. One typical problem is MIB subtrees with too many branches. Another is the format of tables of variables and, particularly their indexes, in a private MIB.

Such problems are now disappearing as standards evolve but, basically implementing vendor extensions into an SNMP management software suite requires that you either choose a software suite that the vendor supplying the extension supports directly, or that you have a good understanding of SNMP plus its associated standards and, sometimes, know how to program in C.

### A Standard Group

The SNMP 'standard' is, as are most things in the TCP/IP Internet Protocol Suite, not one but a group of standards the main elements of which are:

- RFC1155 — The Structure of Management Information;
- RFC1156 — MIB-I;
- RFC1157 — The Simple Network Management Protocol; and
- RFC1213 — MIB-II.

Some important extensions are;

- RFC1229 — Extensions to the Generic-Interface;
- RFC1230 — IEEE 802.4 Token Passing Bus MIB;
- RFC1231 — IEEE 802.5 Token Ring MIB;
- RFC1238 — CLNS MIB — for usage with ISO8473 (Connectionless Network Protocol) and ISO9542 (ES-IS);
- RFC1248 — OSPF ver 2: MIB;
- RFC1269 — Definitions of Managed Objects for the Border Gateway Protocol;
- RFC1271 — Remote Network Monitoring MIB;
- RFC1286 — Definitions of Managed Objects for Bridges;
- RFC1284 — Definitions for Managed Objects for Ethernet-like Interface Types; and
- RFC1285 — FDDI MIB.

There are many more MIBs either defined or in draft form. Most RFCs are quite readable, especially if you have some knowledge of programming in C. If you are interested in a discussion of the implementation of an SNMP client and server you might read Comer and Stevens, *Internetworking with TCP/IP: Volume II*, Prentice Hall, 1991. Many vendors can also supply 'white paper' style discussions of SNMP with specific application to their products.

**Graeme Le Roux**



**NO ONE  
CAN TOP OUR  
TOKEN-RING  
PERFORMANCE.**

**NO ONE  
IS MORE IBM  
COMPATIBLE.**

**NO ONE.**

If you're buying Token-Ring components, it's essential to know which products perform best. And if you've been reading the trade press, you know those products come from Olicom.



In recent *Data Communications* tests, our PC-based bridges outperformed all other vendors' products, winning us "Tester's Choice" awards

and prompting *Data Communications* to call us the "speed demon" and the "clear leader in price/performance."

Just as important, all our products are 100% IBM compatible. In fact, after naming them the best on the market, *PC Week* announced that our Token-Ring adapters were even more compatible with IBM hardware than IBM's own adapters.

And no one can top that.

**olicom**   
TOKEN-RING SOLUTIONS

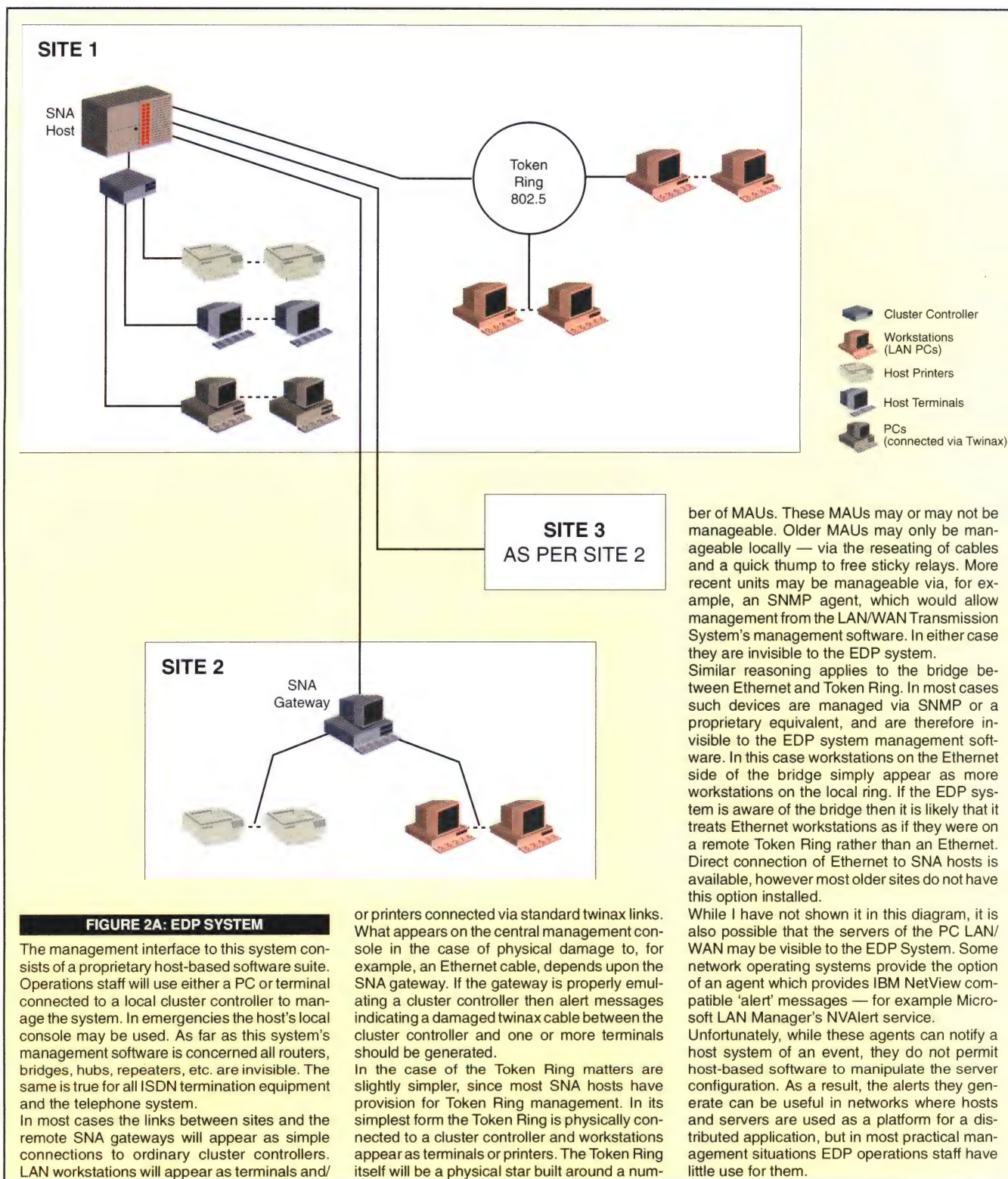
**For more information, contact:**

Australian Distributor for Olicom:

FORCE TECHNOLOGY PTY LTD, P.O. Box 1516 · Dee Why, NSW 2099 · Ph: (02) 971 1000 · Fax: (02) 981 1932

IBM is a registered trademark of International Business Machines Corporation





From page 67

the systems sees the network differently, management is necessarily distributed. This is generally the case in any heterogeneous environment. The reverse, that management of homogenous environments is not necessarily distributed, does not hold.

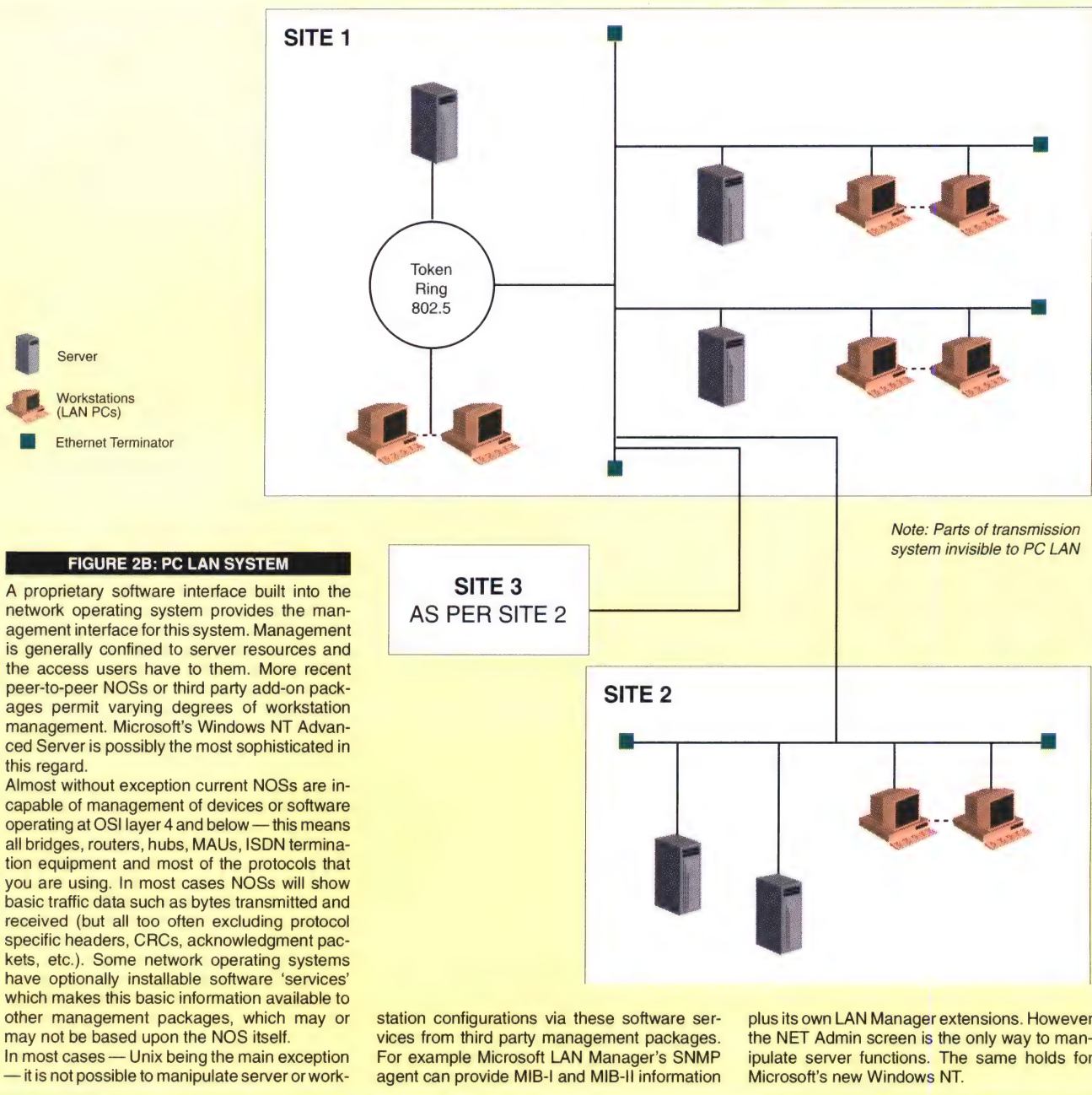
Company A's telephone system has three management consoles, one local to each

PABX, and it is not uncommon to find a local administrator for each site's PC LAN. On the other hand, the EDP system which is as homogenous as the telephone system or the LANs is managed from a central point.

Aside from the technical limitations of the management interfaces of these systems, which I have discussed in the notes accompanying their individual diagrams, there are practical difficulties involved. For

example, it is most improbable that there is any group within most companies, other than the EDP operations staff, who would have the necessary skills or training to manage the EDP system. At the same time, it is most likely that this group's skills at management of a PABX do not extend much past using a telephone handset. Even administrators of the interdependent PC LAN and LAN/WAN transmission systems may





not be qualified to manage each other's systems. I have met Novell CNEs (Certified NetWare Engineers) who are hopelessly confused by the IP addressing scheme and its relationship to SNMP. Most of the 'PC Support' personnel in Australian corporations, who often get responsibility for the LAN/WAN transmission system by default, do not really understand the theory behind either Ethernet or Token Ring. They do understand what will cause problems, e.g. damaged cables, and how to use basic (and almost always automated) test equipment to locate such problems.

Such people are in a poor position to plan, implement and use a sophisticated network management system. If a management console presented a display indicating that, for example, a large number of framing errors is

intermittently occurring on a segment of Ethernet cable most such support personnel would be able to trace the bad packets and isolate the segment in question. In fact some management software will do this automatically. It would then be a relatively simple matter to find a single faulty network adaptor which is causing the problem, but what if the problem is occurring at random (at least apparently so) among several workstations on the segment? Not many management consoles will pop-up a message which says 'This cable segment has a reflection or is not grounded properly. Cable analysis with a time domain reflectometer (TDR) is suggested.' At least not yet.

Either of these problems could appear as sessions dropping out, files appearing to be corrupted and workstations hanging, as far

as PC users and the administrators of the PC LAN system could tell. This is as helpful as the management console displaying packet errors to personnel who do not have the expertise to interpret them. Conversely, I know several network administrators who, through hard-won knowledge can diagnose and rectify these sort of problems using little more than spare cable and a multi-meter. At the very worst, personnel with this sort of expertise can identify the type of problem they are facing and call in appropriate specialists quickly rather than wasting time and money in futile attempts to locate and correct it. On the whole, management dollars are best spent first on developing the expertise of a support team and second on providing only equipment they know how to use.



What a good network management system will do is allow experienced personnel to become proactive rather than reactive. Most of the problems which require a large amount of time and effort to resolve, and therefore cost the most, do not happen suddenly. The sort of problem described above is a case in point. A good suite of management software will generally show a number of small problems for weeks or months before a cable segment or ground point degrades to an extent which will cause a sufficient level of errors to affect a user. Such software also allows administrators to gather data on network traffic flow and make quite accurate predictions regarding future bandwidth requirements. This in turn provides a basis for intelligent decisions about which standards the company might need to adopt in the future.

If you are thinking of implementing FDDI or ATM, for example, ask yourself the following questions: what parts of your network currently require the bandwidth these standards provide? Why is there a high traffic load on these sections of your network? When will other parts of your network require such bandwidth? Can the network be reconfigured to redistribute the existing traffic load? Would a redistribution of the current and future traffic loads result in a more reliable and cost effective network than moving to a high bandwidth standard?

The only way that you can answer these questions is by gathering and analysing traffic data from your network. This can only be done by personnel who understand your network transmission systems working with appropriate equipment. If you don't have people with this sort of expertise and the equipment they need to get the data required you are, at best, basing expensive decisions on guess work.

## Traffic Flows

If you think about the traffic flow in the transmission system of the network shown in Figure 1 and compare the network diagrams in Figures 1 and 2e you will notice that some sections of this network are inherently unmanageable and that their effect on network performance could be significant. First of all, the only elements of the network which can, even theoretically, be managed are those which can be addressed. This means that repeaters and, possibly, MAUs which have no address cannot be managed, cannot notify a management console of their state and above all cannot provide data about traffic flow.

A management package would assume that all the workstations and server(s) attached to the repeater at Site One are directly attached to the 10Base-5 backbone. If someone who was ignorant of the existence of the repeater analysed backbone traffic flow he might well deduce that, for example, the 10Base-5 cable was much longer

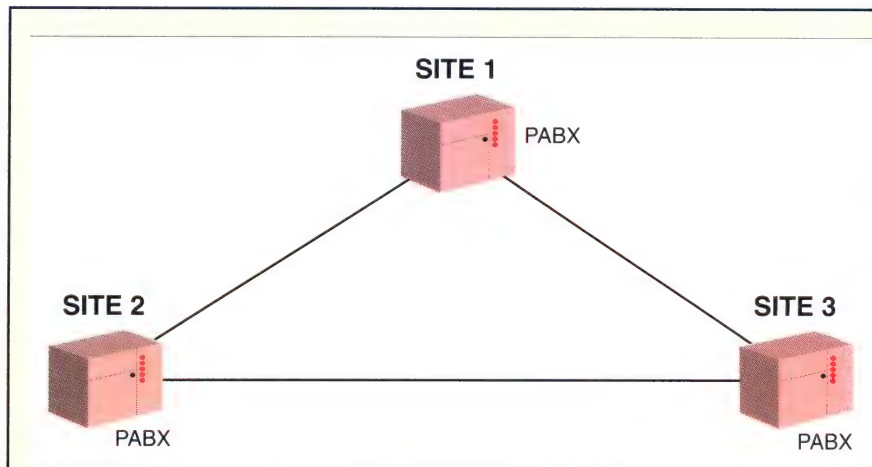


FIGURE 2C: TELEPHONE SYSTEM

This system is managed via a proprietary software interface generally accessed via some form of local console. Dial-up access is a possibility. The system is completely unaware of the rest of the network, although in some specific systems designed for sophisticated call handling and/or service dispatch, telephone systems are closely linked to corporate EDP

systems. In most situations, however, the telephone system is physically separated from the rest of the network. This separation is being eroded around the world as services such as ISDN, ATM and frame relay make integration of voice and data in the wide area cost effective. The increasing use of structured cable systems is also having an effect.

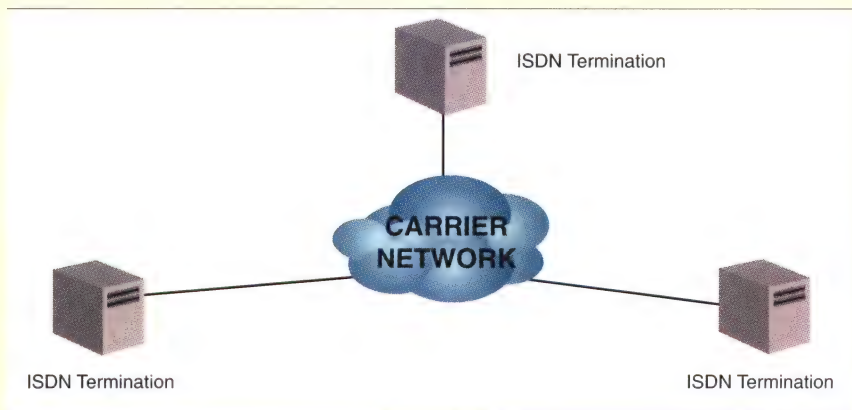


FIGURE 2D: WAN BACKBONE

Once again proprietary software is the main interface to this system, however ISDN termination equipment is appearing with SNMP management capability. Proprietary software is generally resident in the equipment itself and/or a PC host. Communication between a PC host and the ISDN hardware is generally via a serial interface. The allocation of channels is, at present, typically static. Although ISDN permits dynamic allocation of channels, in most cases the ISDN termination equipment cannot be set to do so, either physically or due to interface constraints to the system whose data it is carrying. The ISDN termination equipment in this system is aware of the presence of exchange equip-

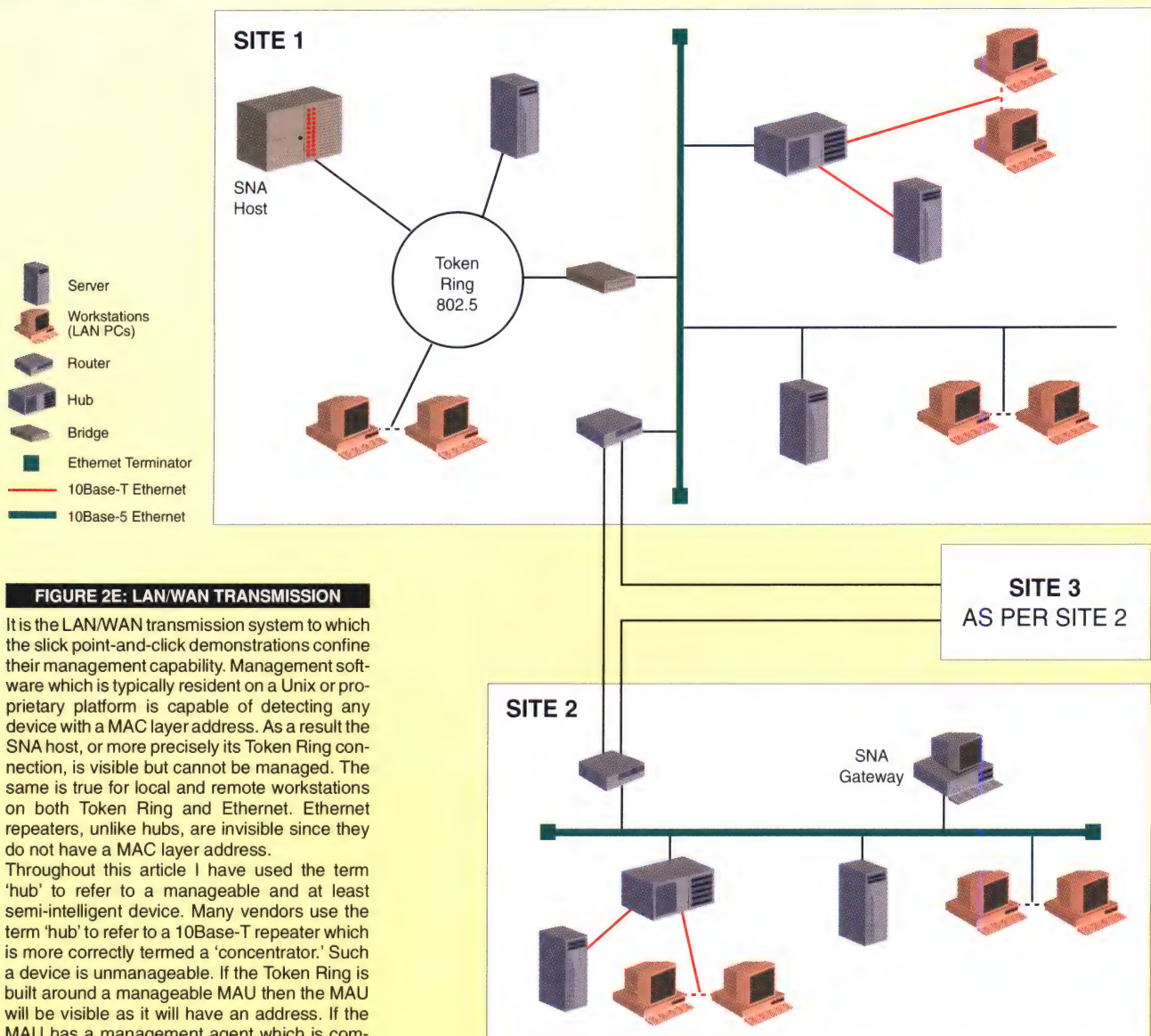
ment in much the same way that a telephone is aware of a voice exchange, that is, it can detect a dial tone and other exchange generated signals. Therefore management of this system is restricted entirely to the ISDN gear at each site rather than permitting either management or simple monitoring of exchange equipment. From the point of view of PTTs this is understandable, however it would be nice to be able to check exchange configurations locally. The equipment in this system is aware of data coming into its interfaces from the other four systems in the network, however it does not generally distinguish between the systems, other than as being connected to different ports.

than it actually is and therefore could not be extended. I was asked to advise on the best way to extend an Ethernet backbone a couple of years ago in just such a situation.

When I reached site I was first shown the new 'network control console' by a justifiably proud administrator. I happened to recognise the vendor-specific half of the Ethernet addresses on the workstation adap-

tor cards that the new network management console was showing as connected to the 10Base-5 backbone. I knew that the vendor in question did not, at the time, manufacture a card with an AUI port and therefore it could not be directly connected to a 10Base-5 cable. When I asked the administrator whether they had spliced 10Base-2 segments into a Base-5 cable or were using





**FIGURE 2E: LAN/WAN TRANSMISSION**

It is the LAN/WAN transmission system to which the slick point-and-click demonstrations confine their management capability. Management software which is typically resident on a Unix or proprietary platform is capable of detecting any device with a MAC layer address. As a result the SNA host, or more precisely its Token Ring connection, is visible but cannot be managed. The same is true for local and remote workstations on both Token Ring and Ethernet. Ethernet repeaters, unlike hubs, are invisible since they do not have a MAC layer address. Throughout this article I have used the term 'hub' to refer to a manageable and at least semi-intelligent device. Many vendors use the term 'hub' to refer to a 10Base-T repeater which is more correctly termed a 'concentrator.' Such a device is unmanageable. If the Token Ring is built around a manageable MAU then the MAU will be visible as it will have an address. If the MAU has a management agent which is compatible with this system's management interface — say SNMP — then it may be manageable via that interface. PC LAN servers will be visible since they have addresses. If these servers have compatible agents — e.g. LAN Manager's

SNMP agent — then they may be monitored from this system's management console, however it is unlikely that they may be manipulated. The same holds for SNA gateways at remote (or

local) sites. Unless the ISDN termination equipment on the LAN has a compatible management interface and therefore has an Ethernet address, it will be invisible to this system.

some form of BNC-to-AUI converter he responded that as far as he knew they were not doing either. After a little cable tracing we found three repeaters — one in a riser and the other two inside the false ceiling on two floors of the building.

Another problem with using repeaters in a network as shown in Figure 1 is that traffic between servers and the workstations connected to them appears on the entire Site One Ethernet. Broadcast traffic may also appear on the Token Ring, depending on the configuration of the bridge between the two. Had bridges rather than routers been used between sites, broadcast traffic from all sites might have been visible across the entire WAN.

While many bridges will support some sort of user-defined filtering which might

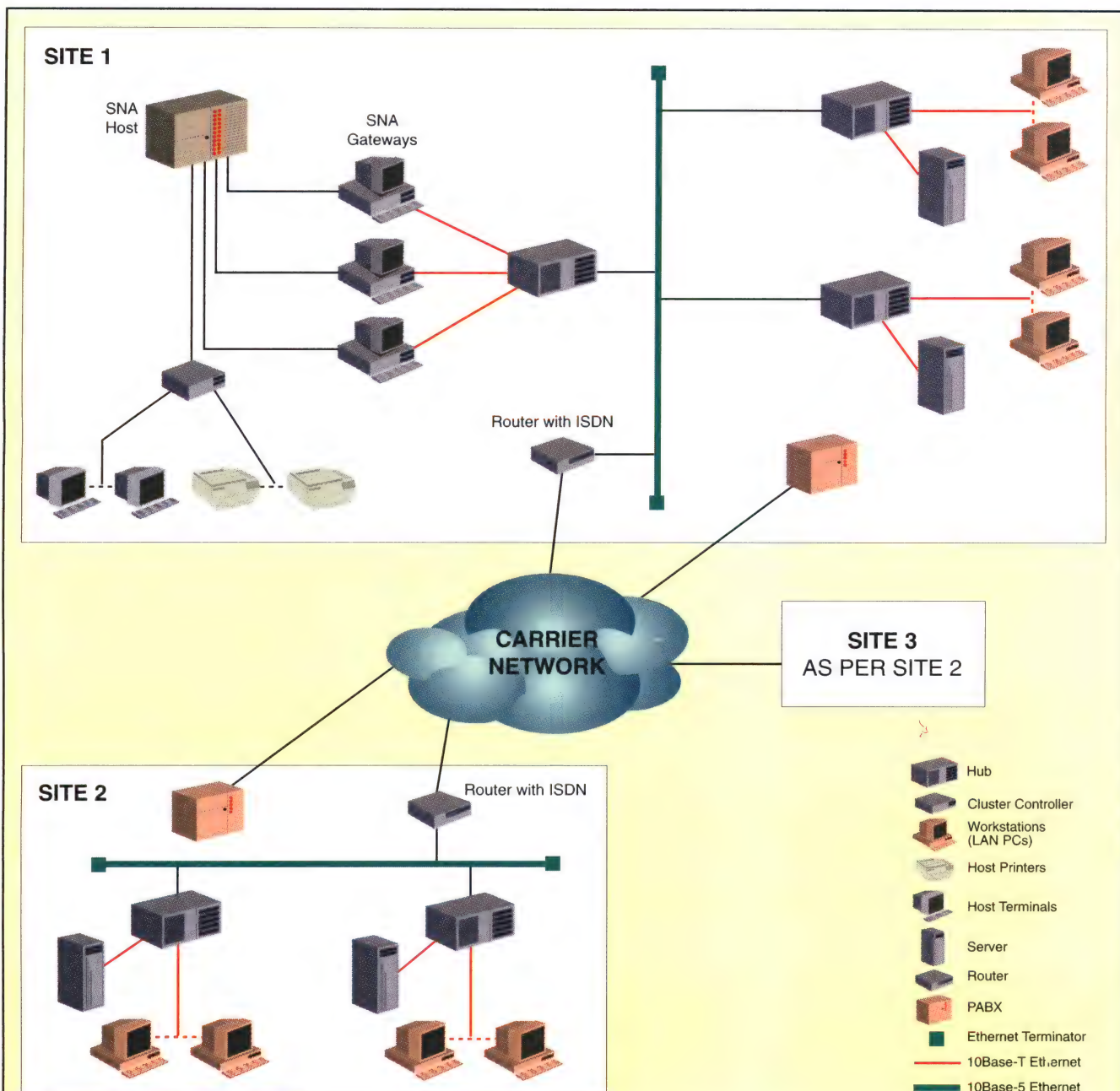
allow an administrator to filter broadcast traffic from wide area links, the PC NOS your network is running may actually require this traffic for proper operation. In most cases all that is required is that servers be able to broadcast to one another. Your PC LAN administrators and your LAN/WAN transmission systems administrators would need to work together to configure both systems for the most efficient use of WAN links.

Another, more common, situation where different management teams will have to cooperate closely is in the installation of a gateway. The SNA gateways in the Figure 1 WAN are a case in point. This type of gateway and its client applications are, bluntly, designed to con the host's management software into thinking that it is a cluster controller with a bunch of terminals

and printers, of a type known to the host, directly attached.

This is not as simple as translating data to and from ASCII. All of the network control signalling, hardware and software, has to be mapped between both sides of the gateway. Error states have to be reported correctly and in a manner the host can interpret. For example, a broken Ethernet cable between gateway and client PC might be reported as a broken twinax cable between cluster controller and terminal while a network session time-out might be reported as a broken cable or, perhaps more safely in some applications, a session time-out at the terminal. When problems occur traces will have to be run at the host, or the gateway if possible; network traffic may have to be examined and PC or gateway configura-





**FIGURE 3: A MORE MANAGEABLE SYSTEM**

The network shown here provides the same services to the same users as the network shown in Figure 1, but it has better management characteristics. It is not a good network design from a reliability stand point. The primary differences between this network and that shown in Figure 1 are that the voice and data systems have been separated, the data network has had all inherently unmanageable elements, such as repeaters and MAUs removed, and the LAN/WAN transmission system has been restricted to two media types. These are 10Base-5 for the backbone and strict single drop 10Base-T to workstations, servers and gateways. This single system, which can be managed via a uniform interface, carries all data to all sites. All SNA gateways are at Site One where support resources are concentrated.

Other changes which have been made are the elimination of all PCs connected directly to twinax and the elimination of host printers at remote sites. By eliminating terminal emulation hardware from PCs a few simple,

standard PC hardware configurations can be used throughout the company. This simplifies support greatly since the EDP system management need not become involved in PC hardware support. The removal of host printers from remote sites also simplifies support and saves the service costs on such printers.

In a real site it is likely that users would initially resist such a change, however by training staff who require host printer output to use the file transfer capabilities which are built into the client software of most SNA gateways this resistance is quickly overcome. The reason for this is that most such printed output is produced as reports of one sort or another. These reports are printed either to store data locally or because they are the only method available to a user for data which they then enter into an application such as a spreadsheet. In the former case, the printout is an unsightly nuisance which can be eliminated by storing the data on a floppy disk. In the latter case, having the data in electronic form eliminates the need for transcription. From the company's perspective such reports often pose a security problem.

tions checked. A simple (to the user anyway) host access problem may result in two or three people having to cooperate to locate a fault and find a solution.

The design of the network transmission system in Figure 1 does not lend itself to this sort of cooperation, since the gateways are mostly at remote sites. Of course you may

not be able to put all your gateways at Site One. If there is not sufficient bandwidth between local gateways and remote clients you could get session time-outs across the



We interrupt your confusion for this important bulletin:  
Accton offers

# One Stop Shop

for your networking needs.

## Tired of hopping around?

Accton gives you a complete line of Ethernet and Token Ring network solutions! An extensive Ethernet family provides you complete support for both your 10BASE-T and coaxial needs with adapter cards, hubs, repeaters, bridges, transceivers and laptop network adapters. Get unequalled price/performance from Accton's 16 Mbps Token Ring adapters and MAUs.

## Building or expanding your networks?

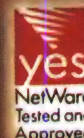
Accton's hubs and adapters are wise investments. They offer full expansion flexibility at a reasonable price. The 12-port 10BASE-T hub is a perfect start for a small Ethernet LAN. Add hubs and workstations as you grow. And integrate SNMP for network management. This scalable growth path gives you enough room to expand while protecting your initial investment every step of the way.

## Laptops on Ethernet and Token Ring?

Accton makes it easy with external adapters that quickly connect to any laptop, notebook, or PC through the parallel port. Get affordable connectivity that fits the palm of your hand.



# See? We have it all!



9001



**ACCTON**  
The Network Technology *Value* Leader

Accton Distributed in Australia by:-  
**A. C. & E. Sales Pty Ltd**

### Sydney

- Elemer Szorkovszky  
54 Blackwall Point Road  
Chiswick NSW 2046  
Phone (02) 712 3555  
Fax (02) 719 8549

### Melbourne

- Mark Blake  
5-7 Napoleon Street  
Collingwood VIC 3066  
Phone (03) 417 3622  
Fax (03) 416 0750

### Canberra

- Bryen Tanner  
Phone (06) 296 1209  
Fax (06) 231 4216





## Datacraft's OpenManager: A CMOT Alternative

Like SunNet Manager, Datacraft's OpenManager software is intended to run on a Sun Sparcstation. The product is based on core code from US-based NetLabs and is designed with the development of management systems for OSI-based networks in mind. It is able to manage TCP/IP-based networks via SNMP, but is primarily intended to make use of CMOT (CMIP over TCP/IP — RFC1098). As a result, migration to CMIP (Common Management Information Protocol) is made considerably easier.

The main advantages of CMOT over SNMP are that it provides full bi-directional communications between devices, i.e. a single device can serve as both client and server whereas in an SNMP environment a device is conceptually one or the other. This in turn means that management of the network can be fully distributed without management applications necessarily being in a hierarchical order or the requirement for some, possibly, non-standard mechanism for communication between management entities (SunNet Manager uses Sun's RPC in this role).

This means that a CMOT-aware application can potentially give the management platform instructions to, as an example, block certain ports on a group of bridges. OpenManager could then look after the details of carrying out the command on each individual bridge. This sort of facility could be used, say, to prohibit network access from certain areas outside

business hours. In order to create an application like this you would have to write it yourself and purchase Datacraft's OpenManager Toolkit. This would be the case for any management platform.

Unfortunately OpenManager does not yet have the level of support from third parties that SunNet Manager does. This means that vendor-specific MIBs have to be integrated into the product's database manually. Fortunately, this is not too difficult. All that is required is a copy of the vendor's MIB defined in ASN.1 syntax. Nearly all vendors, certainly all of the major ones, can make such files available. This file can then be compiled and linked with tools provided in the base product. The process requires, in most cases, little more effort than compiling and linking an ordinary program's source code.

Datacraft ships OpenManager as a base product, which provides basic monitoring, manipulation and display of network nodes, and several add-on modules. The modules available at the time of writing are the Discovery module, which is designed to search a network for manageable agents; the Assist module, which provides automation and routing of service requests together with powerful reporting functions, and the AP 4000 Extended Management Module, which provides management functions which are specific to Datacraft's AP 4000 router family.

**Graeme Le Roux**

WAN. You would have had to evaluate this when choosing a gateway.

## Managing Fault Tolerance

However, even allowing for the sort of restrictions discussed above, Figure 1 is excessively complex from a management perspective. The network can be redesigned, as per Figure 3 on page 74, with management in mind. Such a redesign can be performed at relatively low cost.

Figure 3 illustrates two important points which slick presentations often ignore. Firstly, that a design which has good management characteristics is not necessarily a good system design. The network in Figure 3 (which I'm sorry to say illustrates another fairly common topography) has several elements, notably the Site One 10Base-5 backbone, whose failure would have a disastrous effect. In fact from the perspective of system fault tolerance, Figure 3 is an extremely poor design.

The second thing that Figure 3 illustrates is that just because it is technically and financially feasible to integrate systems, it is not necessarily a good idea to do so. In

Figure 1 the company's telephone and data systems are integrated via the WAN backbone. By breaking the telephone system out of the network the separate management interface for the wide area network backbone can be eliminated and management of that system integrated into the LAN/WAN transmission system. This is no great compromise since the proprietary management interface of most telephone systems is impossible to integrate into any form of standard network management system such as one based on SNMP.

If and when multimedia unites the desktop PC and the desktop telephone as a single unit with a single connection to a single network backbone then this situation may change, but for the foreseeable commercial future such units are a pipe dream, and so is a PABX with a network interface (in this case Ethernet) for management being found in the average company's building.

At present your choice of management software for such a transmission system is largely restricted to a 'proprietary' platform (one which uses only proprietary management protocols) or one based on SNMP and

an ability to use proprietary protocols and agents (note also the work of the Desktop Management Task Force and the Internet Engineering Task Force as reported in 'Extending SNMP to the Desktop,' *Australian Communications*, March 1993).

Other network management standards include SMP (the Simple Management Protocol, see 'Coming Soon to a Network Near You,' *Australian Communications*, March 1993), CMIP Over TCP/IP (CMOT) which is the basis for Datacraft's OpenManager software, and of course OSI's CMIP, the Common Management Information Protocol (see Alan Lloyd's *OSI Tutorial* in the April 1993 edition for a brief comparison of CMIP and SNMP).

If you are using a given vendor's hosts as servers, the same workstation which runs your management software can, theoretically, be used as a server administration platform. Assuming that you have personnel who are competent to manage both your transmission system and your hosts, then you could manage both systems from a single console. This is not integrating both systems. You would have two applications running on single platform, not a single application. Given that personnel with the necessary level of expertise in both systems are uncommon, it is more likely that you will end up with two groups and therefore two management platforms. Another catch to single station management is that not all vendors will provide their proprietary extensions to management information bases (MIBs) for all platforms. The fact that must be borne in mind is that the management platform you choose will determine the system hardware options you have available just as much as system hardware options determine your options for a management platform.

In summary, the concept of a single person being able to totally manage a heterogeneous system from a single workstation at a single site is, and will remain (permanently I suspect) for the foreseeable future, a purely theoretical one.

One of the two inescapable facts of network management is, however, very simple and, I hope, no surprise to anyone: good management is the result of a good team of people working efficiently in an environment which they understand completely. For this to be possible that team must have all the necessary network management tools which they know how to use, and the network they are supporting must be properly designed and implemented.

The second inescapable fact of network management is that it you don't keep the first fact in mind you will waste a large amount of money very quickly.

*Graeme Le Roux is a Director of Moresdawn Pty Ltd (Bundanoon, NSW) and specialises in local area network consulting services.*



# MEET OUR MANAGEMENT TEAM

*"No two networks are alike. By manufacturing and developing the industry's broadest product line, we can tailor any network to our customers' needs."*

S Robert Levine  
President & CEO



## Ethernet, Token Ring and FDDI

At Cabletron Systems, we recognize the integrated networks of today provide your company with the competitive advantage it needs tomorrow. In response to your needs we've developed the broadest product line of leading-edge technologies that fully integrate under Cabletron's powerful network management umbrella.

### **Intelligent Hubs**

Cabletron's Multi Media Access Center intelligent wiring hub series connects Ethernet, Token Ring and FDDI local and wide area networks together in a single chassis. Our other hub products include standalone devices for 10BASE-T and Token Ring smaller connectivity environments.

### **Management Platforms**

Remote LANVIEW®/Windows, the industry's first management software solution for SNMP

Ethernet and Token Ring networks, was the world's first network management software package to offer completely integrated worldwide desktop LAN/WAN management from a central control console.

And now we've brought network management to a new level with SPECTRUM,™ Cabletron's advanced management platform, that goes far beyond the current generation of management systems to provide a cohesive, powerful and flexible environment for managing multi-vendor networks.

**CABLETRON**  
systems

The Complete Networking Solution

### **Desktop Connectivity**

Of course there's more, including Cabletron's own Ethernet and Token Ring Desktop Network Interface (DNI®) adapter cards, the industry's first manageable adapter card solution; as well as our entire line of manageable 10BASE-T and Token Ring connectivity products.

It is easy to see why Cabletron has become the leader in network management technologies. That's why over 22,000 customer sites already use our products to connect more than 2 million network nodes. Use Cabletron's network management team to give your company the competitive edge it needs.

Call us today for our product brochures or a live demonstration.



# 50bit/s to 2048kbit/s: Hand-held test solutions for Data, PCM, ISDN and GSM Networks

## PF-30 Bit Error Analyzer

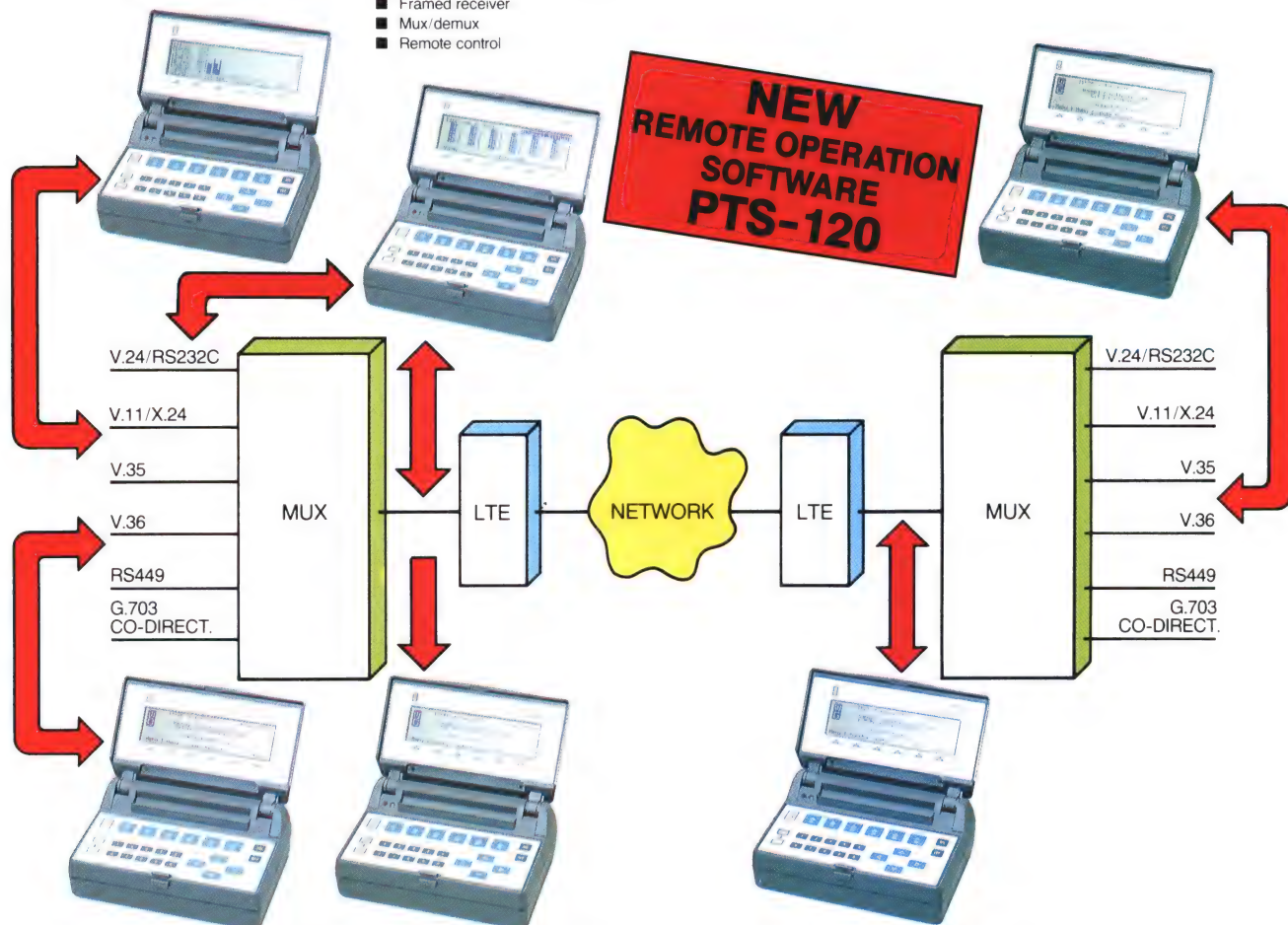
- 50bit/s to 2048kbit/s
- Interfaces:  
Built-in — G.703 2048/704kbit/s,  
G.703 co-dir., V.24/RS232C, V.11/X.24  
Via adaptors — V.35, V.36/RS449
- Remote control

## PFA-30 Digital Communications Analyzer

- 50bit/s to 2048kbit/s
- Interfaces:  
Built-in — G.703 2048/704kbit/s,  
G.703 co-dir., V.24/RS232C, V.11/X.24  
Via adaptors — V.35, V.36/RS449
- Framed generator
- Framed receiver
- Mux/demux
- Remote control

## PF-25 Bit Error Analyzer

- 1kbit/s to 72kbit/s
- Interfaces:  
Built-in — V.24/RS232C (sync)  
Via converters — V.11/X.24  
(via IC-21), V.35 (via IC-35)



## PF-20 Bit Error Measuring Set

- 1kbit/s to 256kbit/s
- Interfaces:  
Built-in — G.703 co-dir., V.11/X.24  
Via adaptors — V.35, V.36/RS449

## PA-10 PCM Performance Analyzer

- 2048kbit/s
- Interfaces:  
G.703 balanced and unbalanced
- Unframed generator
- Framed receiver
- Remote control

## PA-20 PCM Performance Analyzer

- 2048kbit/s
- Interfaces:  
G.703 balanced and unbalanced
- Framed generator
- Framed receiver
- Remote control

The Wandel & Goltermann family of hand-held BER and PCM testers offers multi-purpose, multi-interface test solutions for commissioning, maintaining and trouble-shooting digital networks.

The user can carry out framed and unframed testing on a wide variety of equipment such as multiplexers, demultiplexers, digital cross-connects, automatic protection switches and circuits operating at speeds from 50bit/s to 2048kbit/s.

Applications include the evaluation of the quality of digital transmission

paths, trouble-shooting data circuits and isolating network and transmission faults.

The new Performance Test Software PTS-120 enables the PA-10, PA-20, PF-30 and PFA-30 to be operated remotely.

**Wandel & Goltermann Pty Ltd**  
42 Clarendon Street  
South Melbourne Victoria 3205  
Tel: (03) 690 6700 Fax: (03) 690 6750



# Building a Messaging Backbone

For enterprise-wide messaging backbones to be really effective in helping users communicate, they need to be able to pull together the range of different mail systems typically running within an organisation.

Forget Marshall McLuhan's famous aphorism. When it comes to the e-mail backbones now being pieced together at corporations worldwide, it's the medium, *not* the message. Companies investing seriously in messaging technology aren't interested in giving their employees an electronic way to trade jokes and make lunch dates (they've already got a phone system for that). What they're looking to do is improve productivity and boost profits by automating workflow and developing applications that let users collaborate effectively and efficiently.

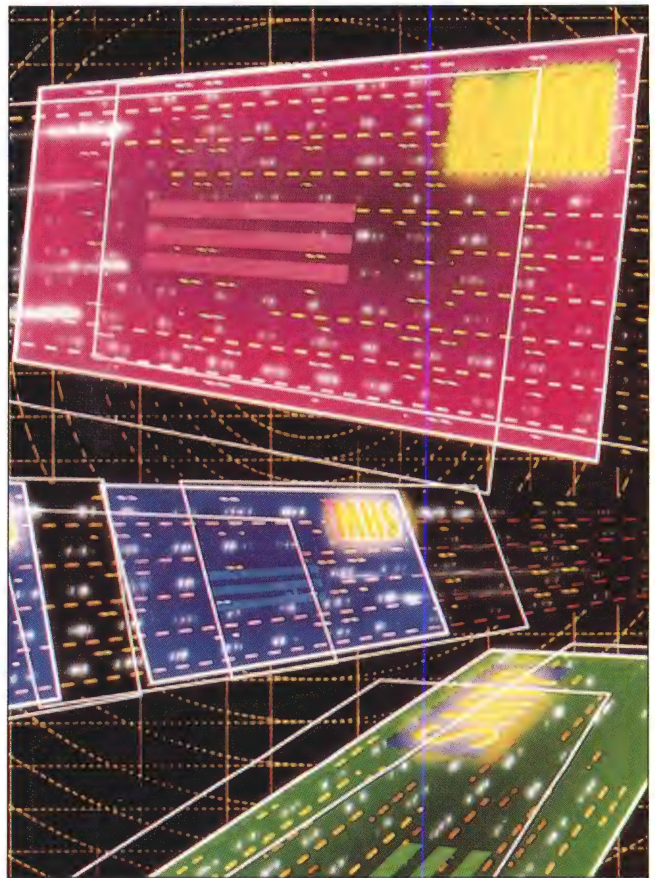
But getting to that point means building an integrated messaging backbone that ties together all the disparate LAN e-mail packages now running throughout the enterprise. Until recently, that's been a tall order, even for the most technologically astute companies.

Now that the first products that conform to the extended version of the CCITT's X.400 messaging standard are starting to appear, establishing a messaging backbone need no longer be a costly, frustrating exercise. And some of the familiar alternatives to X.400 — most notably the simple mail transfer protocol (SMTP) used on the Internet and the Message Handling Service (MHS) from Novell — have been beefed up to offer advanced features like security, distributed directories, and extensions that add images to text. Further, mail applications based on Lotus Notes are being written. Whether this promising technology will prove a viable alternative to X.400, SMTP, and MHS remains to be seen.

Just three years ago, the whole idea of building a messaging backbone would have seemed pointless to most network managers. Messaging services were furnished primarily by host-based systems, such as PROFS for IBM mainframes or All-in-One for DEC minicomputers.

The huge boom in LAN e-mail has changed all that. According to research company IDC, by 1992 50% of all e-mail users were working with LAN-based packages, up from 20% in 1990 (see Figure 2 on page 82). Meanwhile, the number of users of mainframe-based messaging dropped from 30% to 15% over the same period. These figures don't indicate that half the e-mail users have moved from mainframes to LANs, but that most new users are working with LAN messaging. This trend is likely to continue. IDC predicts the number of LAN e-mail users will grow tenfold by 1997.

That growth could well make life miserable for network managers. Consider that most companies give their departments free rein when selecting e-mail systems. Everyone in engineering, for instance, might be running cc:Mail from Lotus, while accounting could be sending spreadsheets back and forth using Microsoft Mail



and the billing department might be working with Beyondmail from Beyond Inc. to update database files with inventory information.

The result is a patchwork of proprietary e-mail systems that can't communicate with one another. One IS manager, in fact, reported that there were 22 different messaging systems in his organisation, and he's now responsible for linking them.

There are two ways to ensure that all e-mail users can communicate — no matter which system is employed locally. Point-to-point



**Table 1: Selected E-Mail Gateways**

VENDOR	PRODUCT	SOFTWARE	HARDWARE	X.400	MHS	SMTP	LAN E-MAIL PACKAGES
<b>Alisa Systems</b> Praxa (02) 957 5607	Information Switch	VAX/VMS	VAX	1984	No	Yes	cc:Mail, Microsoft Mail, SMTP-compatible packages
<b>CompuServe Pacific</b> Fujitsu Australia 008 025 240	CompuServe Mail Hub Gateway	None	None	1984	Yes	No	Any MHS-compatible package
<b>GE Information Services</b> (02) 957 9200	Quick-Comm Service	DOS, Macintosh OS	PC, Macintosh	1984	Yes	No	cc:Mail, Microsoft Mail, Quickmail, Vines Network Mail, MHS-compatible packages
<b>Infonet Services</b> 008 035 065	Notice 400	DOS, Macintosh OS, Unix	PC, Macintosh	1984, 1988	Yes	No	cc:Mail, Microsoft Mail, Quickmail, Vines Network Mail, Higgins Mail, WordPerfect Office
<b>IBM</b> 13 24 26	Mail LAN Gateway/2	OS/2	PC	1984	No	No	cc:Mail, Lotus Notes, SNADS
<b>Lotus Development</b> (02) 287 1900	Link family of products	DOS, OS/2	PC	1984, 1988	Yes	No	cc:Mail, Lotus Notes, MHS-compatible packages
<b>MCI Communications</b> (02) 983 9788	MCI Mail	DOS, Macintosh OS, Windows	PC, Macintosh	1984, 1988	Yes	Yes	cc:Mail, Higgins Mail, Vines Network Mail, Microsoft Mail, Lotus Notes, WordPerfect Office, MHS-compatible packages
<b>Microsoft</b> (02) 870 2200	Gateway to X.400, Gateway to MHS, Gateway to SMTP	DOS, Unix, Windows	PC	1984	Yes	Yes	Microsoft Mail, MHS-compatible packages, SMTP-compatible packages
<b>NCR Corporation</b> (02) 964 8111	StarPRO X.400 Enterprise Gateway	DOS, Unix	PC, NCR System 3000	1984, 1988	No	Yes	Unix e-mail packages
<b>Notework Corporation</b> Direct Access (049) 264 122	Notework Electronic Mail Gateway	DOS, OS/2	PC	1984	Yes	Yes	cc:Mail, Higgins Mail, Lotus Notes, Microsoft Mail, WordPerfect Office, MHS-compatible packages, SMTP-compatible packages
<b>Retix</b> Com Tech (02) 317 3088	OpenServer family	DOS, Macintosh OS, OS/2, Unix	PC, Macintosh	1984, 1988	Yes	Yes	Beyondmail, cc:Mail, Higgins Mail, Microsoft Mail, WordPerfect Office, MHS-compatible packages, SMTP-compatible packages
<b>Soft-Switch</b> Software Distribution International (02) 906 8600	SNADS Gateway, Lotus Notes Gateway, NetWare MHS Gateway	DOS, Macintosh OS	PC, Macintosh	1984, 1988	Yes	No	cc:Mail, Lotus Notes, Higgins Mail, WordPerfect Office, Microsoft Mail, MHS-compatible packages
MHS = Message Handling Service SMTP = Simple Mail Transfer Protocol SNADS = Systems Network Architecture Distribution Services							

connections between groups can be established via gateways. In the foregoing example, that would result in 21 gateways for every group — costly, and a network manager's version of hell.

Further, gateways usually pose a problem for most e-mail systems because they limit functions (such as the ability to search for an address) and they usually don't pass acknowledgments.

Until recently, the only other alternative was to build a messaging backbone using X.400 and X.500 directory services specifications determined by the CCITT. This approach reduced complexity by requiring no more than one gateway per electronic

mail system. And in some cases, X.400 could be used locally, which meant that it was possible to tie directly into the backbone with a gateway. What's more, X.400 backbones delivered sophisticated security and (thanks to X.500) distributed directories that let users find the e-mail address of other clients and help route messages through the network.

It all sounds great, but X.400 networks were often quite expensive to build and support. Further, the popular consensus is that they can be difficult to manage and even tough to learn to use effectively. An X.400 address, for instance, can easily have 10 fields, all of which need to be filled in to

make sure that the message gets to the proper recipient. LAN e-mail packages, in contrast, often use common names and departments to route messages.

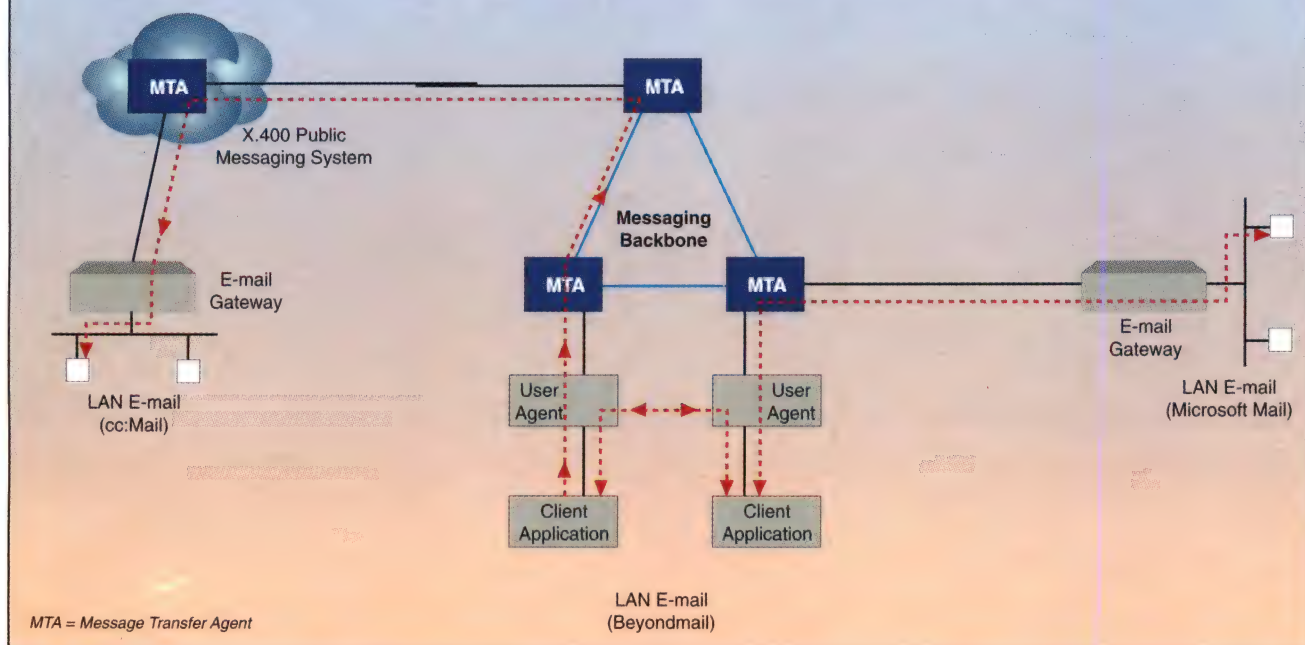
### Not by X.400 Alone

These days, though, X.400 is no longer the only game in town. MHS from Novell, which has been widely used in workgroups and departmental LANs, has been augmented with a directory naming service and binary attachments that gear it to enterprise messaging backbones. And the IETF (Internet Engineering Task Force) has added security and a naming service to SMTP, the messaging protocol used for Internet Mail.



**Figure 1: To Build a Messaging Backbone**

Building a messaging backbone is not all that different from setting up a bridge/router internetwork, except that message transfer agents (MTAs) are used to forward, relay and route messages. Clients on different e-mail systems can reach the messaging backbone either through a gateway or with user agent (UA) software that puts messages in the proper format before MTAs forward them over the network.



Here again, these new features suit SMTP for more than the academic and engineering communities.

And X.400 is no longer the pricey, over-complicated technology it once was. Vendors have brought out products that run on PCs and Macs rather than the high-end Unix minicomputers that once were the only X.400 hosts. That not only brings the price of X.400 well within reach, but also makes the messaging standard much less daunting to deploy, since it now can be accessed with familiar prompts rather than Unix's arcane command structure.

These new products actually conform to the enhanced version of X.400 approved by the CCITT in 1988. (The original spec was finished in 1984). The 1988 additions bring security, distributed directories, and store-and-forward capabilities to the international standard. Unfortunately however, they also bring something far less desirable: interoperability problems.

### Application Inspection

X.400, MHS, SMTP — it's not an easy choice. The place to begin is with an assessment of an organisation's current infrastructure and an analysis of what sorts of applications will be carried on the messaging backbone. If a company simply wants to link NetWare workgroups, for example, an MHS backbone would be the likely choice. If there's already a big investment in Internet Mail, then SMTP would be the logical alternative. Then again, X.400 is often seen as the lingua franca of messaging, since this

CCITT standard has been adopted by all the major public service providers.

When it comes to applications, X.400 really shines. It already offers a standard way to consolidate EDI (electronic data interchange) networks with messaging backbones. According to US-based market researchers BIS Strategic Decisions, 75% of the 20 *Fortune 500* companies they surveyed maintain separate networks for EDI and e-mail, so this is going to be a healthy market. The survey participants said that by next year they'll average one million messages per month.

Multimedia is another hot application, and companies are already starting to look at it as a serious business tool. SMTP has a bit of a jump on its rivals here, since the Internet community has developed a standard way to carry the mix of voice and images that would be regular fare on most multimedia mail systems.

### At the Hub

Delivering enterprise-wide messaging is not all that different from building a bridge/router internetwork to carry data. But in this case, message transfer agents (MTAs) are deployed to forward, relay, and route messages. An MTA is software that runs on a dedicated workstation that functions as a store-and-forward hub for mail systems. A group of linked hubs forms the actual messaging backbone, like connected routers establish an internetwork (see Figure 1).

Clients reach the messaging backbone in two ways, either through a gateway or with

user agent (UA) software that puts messages in the proper format so that the hubs can forward them over the network. Gateways, as mentioned, deliver connectivity but cannot support the full range of functions that clients get when they link directly to the backbone via user agents. For example, users going through a gateway can't look up the address on another segment.

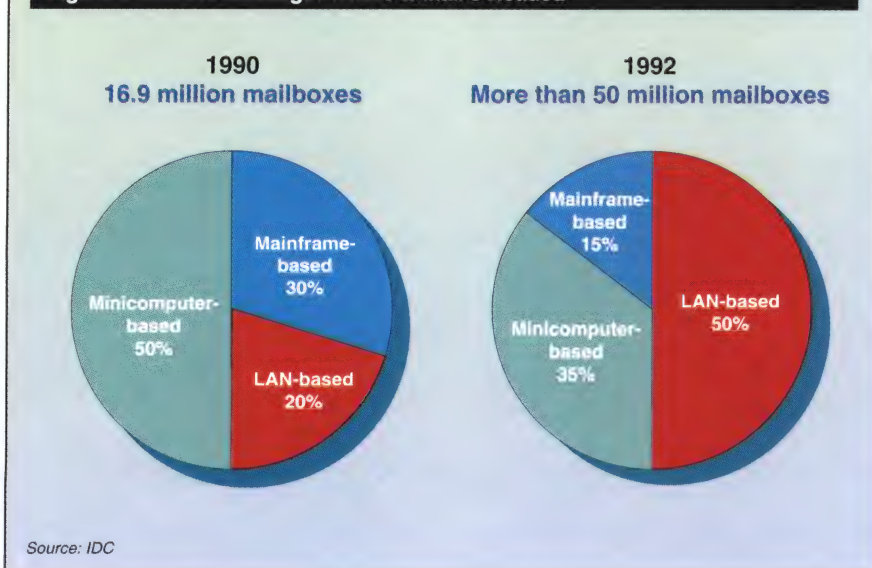
Customers that opt for X.400 will likely end up using a large number of gateways. At the moment, there are very few LAN-based e-mail systems that use X.400 as their underlying protocol. X.400 was seen early on as too complicated and too expensive for the mass market. But this situation is improving. Products for PCs have already appeared from DEC, Hewlett-Packard and Alfa Software, and Lotus has pledged to bring an X.400 version of cc:Mail to market this year.

Although gateways aren't the best way to build a messaging backbone, at least there are plenty of X.400 products to choose from. On the software side are such companies as Microsoft, NCR, Retix and Soft-Switch (see Table). Companies that need to link geographically dispersed sites can also use public carriers that offer X.400 gateway services, including Compuserve, GE Information Services, Infonet, MCI Communications, and Sprint.

### Alternative Realities

Companies looking at MHS will most likely be heavy users of NetWare. If that's the case, they won't need many gateways be-



**Figure 2: Get the Message: Where E-Mail's Headed**

cause most of the LAN e-mail packages they're now using are based on SMF (Standard Message Format), the same messaging protocol employed by MHS. Like X.400, public carriers have MHS mail hubs, which enable quick, dial-up connections between sites. Novell also offers NetWare Global MHS, which can be used to link the NetWare mail systems at different companies or sites.

Now that SMTP is moving into the corporate community, access is no longer a matter of using a Unix workstation to tap into the Internet. Gateway vendors are consequently starting to deliver the requisite software. These include Lotus, Microsoft and Fischer International Systems.

## The Daily Grind

Given the availability of gateways, low-level connectivity on any messaging backbone is pretty much a given. That makes day-to-day issues like implementation, ease of use, distributed directories and security all the more important.

X.400 has had trouble living down its reputation as an expensive, Unix-based messaging system, but these days MTAs are available for nearly all common platforms. And since there are more X.400 packages on the market than any other kind, it should be relatively easy to match one to a company's particular needs.

Implementing an X.400 network is generally done in three stages. The first step is to install the MTAs at each location. The second step is to deploy user agents at the LAN level. This means running a full X.400 protocol stack on each client that needs to access the backbone. The third step is to set up X.400 gateways between workgroups and the backbone.

Right now, only a few vendors offer MTAs that conform to the 1988 X.400 spec.

All of the X.400 providers plan to offer X.400 services that conform to the 1988 spec sometime this year. MTAs that adhere to the 1984 spec are far more common. Retix offers them, as do Apple and Microsoft. These products run on PCs, Macs, and Unix workstations and under all popular operating systems (DOS, Apple's System 7, and most flavours of Unix).

Setting up an MHS backbone is much simpler, since MHS is packaged as an NLM (NetWare Loadable Module), and thus can share a file server with other NetWare applications. It also can run on its own in a dedicated mail server (the equivalent of an MTA). As a NetWare application, it uses the same addressing scheme as any Novell network, and users also will be familiar with the interface. Once MHS is installed, network managers can order up gateways to the wide-area from service providers.

Because SMTP is an Internet protocol, it can be used over any TCP/IP net. Building a messaging backbone means deploying MTAs throughout an organisation. Until now, most SMTP users simply dialled into a host computer on the Internet to access the mail services. Now, the same type of service must be delivered to users on LANs. This means running user agent software on clients or using gateways to reach the Internet.

SMTP is still geared to engineering and academic users, and its interface shows it. Command-line instructions are needed to send mail, and to date no graphical user interface has been developed.

## You Could Look It Up

Standards for directory services have been developed for X.400 and SMTP, and Novell has announced a naming service for MHS. But companies have been slow to translate their internal directories into a format that lets them take advantage of what's available.

Nevertheless, organisations that plan to link to business partners and subsidiaries via messaging backbones need to have a uniform addressing scheme and a way to look up every user's address that's no more complicated than a corporate phone directory. X.400 alone makes it possible to work with distributed directories. This is very important, since distribution makes it possible both to maintain local directories (at different sites and companies) and to search all these databases as if they were actually a single directory.

The X.500 standard, developed as part of the 1988 X.400 spec, details how distributed directories are to be built and maintained. X.500 also provides a way to synchronise directories, so updates and changes to one are noted globally. In effect, it keeps track of address changes so MTAs always know how to route messages.

Until last year, X.500 was the only standards-based directory available. The IETF has now created its own directory service, which it calls the Domain Name Service. This lists only e-mail hosts. Internet users can't look up the addresses of individual recipients (as they can with X.400), but as long as they know the name of the recipient and the local host, the message will be delivered. Internet addresses are invariably very simple and include just the names of the recipient and the host.

In April, Novell enhanced the directory service for NetWare global MHS. It introduced the Novell Network Registry, a centrally administered directory maintained by the company. Companies register the addresses of all their users with the service, and Novell takes care of all administration and maintenance.

Novell still offers directory services for Global MHS based on the NetWare bindery, the firm's LAN directory service. Global MHS allows directories to be synchronised within a single domain (typically, one company's backbone). Directories beyond that domain, however, cannot be synchronised. Novell also has adopted X.500 for use in NetWare 4.0, its new high-end operating system for enterprise networks for users who need synchronisation beyond a single domain. But X.500 synchronisation comes at a price; it complicates NetWare's simple addressing structure. For that reason, many companies may simply stick with NetWare Global MHS. Whether Novell will adopt X.500 for earlier versions of NetWare is not known.

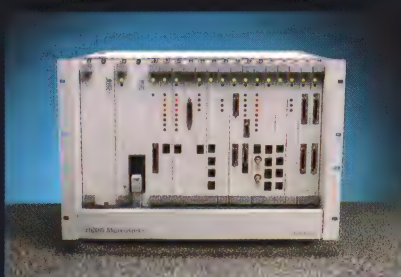
## Keeping Secrets

Once a directory affords users on a network access to resources, security becomes a major issue. X.400 has a full set of security provisions, specified in X.509. The spec offers password identification, as well as digital signatures, encryption, and audit trails. Digital signatures are used to authenticate





# Solutions



**Networking Multiplexers**  
for  
**Voice**  
**Data**  
**Video and**  
**ISDN Applications**



**A complete family**  
**including support for**  
**smaller sites**



**Data only applications**  
**supported by**  
**Advanced ISDN**  
**Terminal Adaptors**



**Intelligent PC**  
**Add In cards for**  
**Advanced DeskTop**  
**Applications**



**Comprehensive yet**  
**affordable**  
**Network Management**

## Head Office

Jtec Pty Limited  
ACN 003 169 088  
Unit 3  
118 - 122 Bowden St  
Meadowbank 2114  
NSW Australia

## Phone

International 612-809-6933  
Sydney 02-809-6933  
Melbourne 03-263-0200  
Brisbane 07-229-9137  
Canberra 06-256-3480  
Europe 35-321-277-422

## Fax

International 612-809-6619  
Sydney 02-809-6619  
Melbourne 03-263-0215  
Brisbane 07-221-6625  
Canberra 06-201-3003  
Europe 35-321-270-420



that a message actually comes from the user whose name is appended to it and that the content is unchanged.

The IETF recently agreed to a set of security specifications, called Privacy Enhanced Mail (PEM). Although not as extensive as X.509, PEM provides a way to encrypt messages using the same algorithms and also uses digital signatures. PEM does not offer audit trails.

MHS uses NetWare's built-in security features, such as passwords and identification. Access control levels can also be set to block unauthorised access from servers.

## Suitable Attachments

Of course, a secure messaging infrastructure is just the beginning. Once it's in place, companies want to build distributed applications that take full advantage of it. Doing so means working with binary attachments, which let users integrate spreadsheet files, graphics, non-ASCII files, and the like with text-based messages.

X.400 outlines a way to exchange fax data, images, and other binary files between message transfer agents. Novell also has the ability to exchange binary files over MHS.

SMTP has just begun to support binary attachments with its multipurpose Internet Mail extensions (MIME), an IETF standard

that handles a wide variety of data, including multimedia. Users are already sending multimedia over the Internet with MIME.

As noted, many companies are eager to move their EDI applications onto messaging backbones. X.400 is the only messaging protocol that offers a standard way to exchange EDI over a messaging system (as detailed in the X.435 spec). What's more, an X.400 backbone automatically maintains audit trails, a common legal requirement when sending EDI.

## Worth Noting

When it's all said and done, the whole aim of a messaging backbone is to make it easier to build distributed applications. X.400, MHS and SMTP can all serve as the underlying transport that these applications ride on. Lotus is taking a very different approach with Notes. Its workgroup software offers an alternative to enterprise-wide messaging systems.

Notes offers something no other messaging platform has to date: an API that's been embraced as an industry-wide development tool by vendors of commonly used LAN applications such as word processors, spreadsheets and database programs. The Vendor-Independent Messaging (VIM) API thus makes it easy to share files among

programs. Notes still must run on an inter-network, but it furnishes the application-to-application connectivity that's hard to get with X.400, MHS and SMTP.

The X.400 community has been trying to come up with a standard API that could offer functions like those of VIM. It's common Mail Calls (CMC) establishes limited links between programs and messaging systems. Although there are plans to enhance CMC, the truth is that even coming up with the basics has taken a long time.

Notes 3.0 supports X.25, which gives users a way to communicate, either through a private X.25 network or over a public network. If carriers install public Notes servers on their networks, Notes could become an alternative to X.400, MHS and SMTP.

In Notes 3.0, released in worldwide in March, Lotus addressed many of the product's previous shortcomings. Notes originally ran only on OS/2 servers and on OS/2 and Windows clients. Notes 3.0 supports DOS and Macintosh clients and NetWare servers. Lotus will be releasing a version of Notes for Sun Unix in September, with other Unix versions to follow.

*Salvatore Salamone is Internetworking Editor for Data Communications magazine. He is based in New York.*



JWT HTM 157

Simply rent an HP Network Advisor from Tech-Rentals. It's the only expert based LAN troubleshooting tool that tells you, and proves to you, what's wrong with your network.

- \*Lets you send and receive simultaneously.*
- \*Easy to use windowing interface.*
- \*Focuses on bad frames – no searching through lines of protocols.*
- \*On line help screen. Utilise capacity planning features.*
- \*Flexible thresholds, alarms and trends – user defined or automatic.*

Rent an HP Network Advisor for as little as one day to a year or more. Phone now for details.

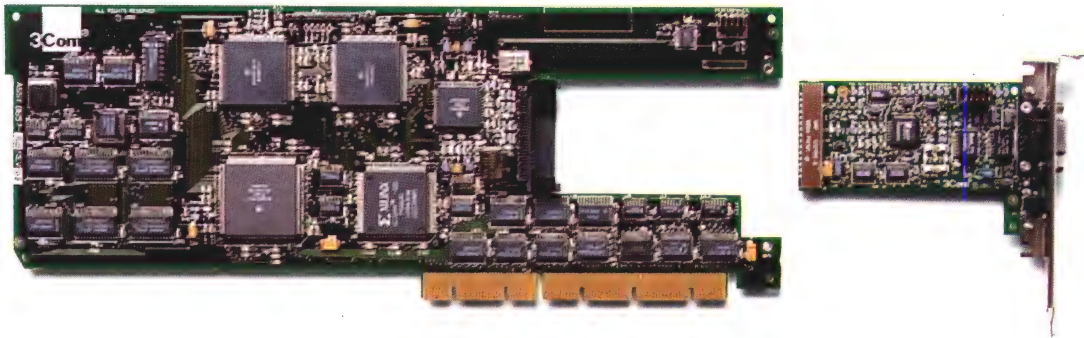


Melbourne (03) 879 2266	Sydney (02) 736 2066
Brisbane (07) 875 1077	Adelaide (08) 344 6999
Perth (09) 470 3644	Canberra (06) 253 1825
Auckland (9) 520 4759	Wellington (4) 84 4833

## Tech-Rentals



# Think of this as the match that lit the fuse that started the FDDI revolution.



*FDDILink's unique "PMD" module design makes changing media a snap.*

Every revolution has its moment of truth. For FDDI, that moment is now.

Introducing 3Com's FDDILink™ family of 32-bit EISA adapters. They bring blistering FDDI performance to your network for as little as \$2,500. That's up to half the cost of comparable adapters.

And that's not all. Backed by a lifetime warranty, the FDDILink family gives you the flexibility to ease your network into FDDI, at your own pace. Thanks to their unique "PMD" module design, FDDILink adapters can be used with shielded twisted-pair cable or fiber-optic cable. And even with unshielded twisted-pair when standards are finally approved. Simply plug in the appropriate media module.

Now you can let the high-powered hardware and software on your network perform at its full potential.

That's because FDDILink can deliver 100 Mbps performance to the desktop using lower-cost shielded twisted-pair copper cable and connectors.

And what's even better, when you add 3Com's NETBuilder® II Routers and LinkBuilder® 3GH Hubs, you have a total solution that runs all the way from the desktop to the WAN.

But that's enough talk. For FDDI revolutionaries, this is a time for action. Call (02) 959 3020, ext. 22, or contact your nearest 3Com distributor.



***Networks That Go the Distance™***

Tech Pacific Australia  
(02) 697 8666

Tech Pacific New Zealand  
(09) 415 8300

MM Data Networks Australia  
(02) 980 6922

BICC Communications New Zealand  
(09) 358 0322

i.t. connXions Australia  
(02) 415 0555

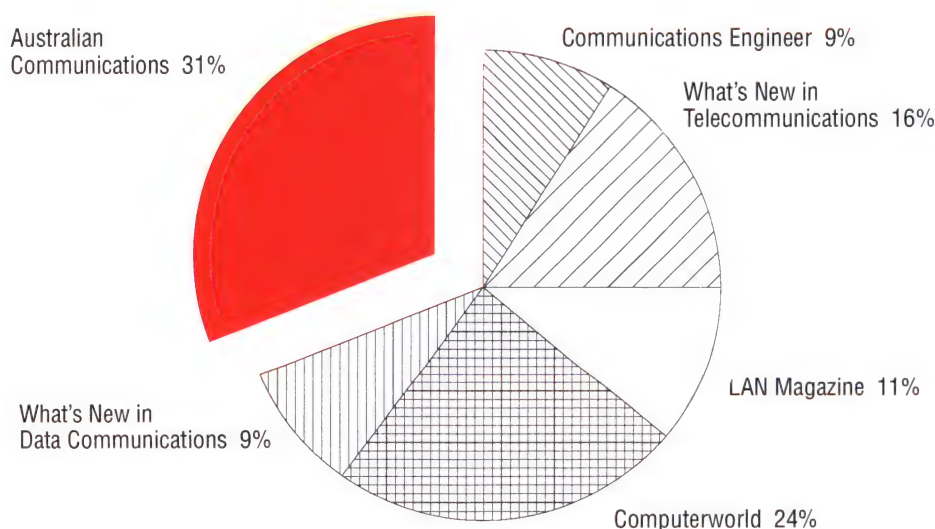


# Which publication is read by more communications professionals?

ATUG - The Exhibition and Conference of the Australian Telecommunications Users Group is unquestionably the major communications event in Australia. Visitors to the annual event are widely considered to be the region's top communications professionals, responsible for the lion's share of its networking and telecommunications purchasing.

Upon registering at ATUG'93 visitors were requested to indicate the communications/networking publications they regularly read. Judging from the **4,690\*** completed questionnaires *Australian Communications* is clearly the choice of communications professionals

" I regularly read...."



Data supplied by Riddell Exhibition Promotions, organisers of ATUG'93

\* Does not include conference delegates, pre-registrations, or visitors with completed coupons from advertisements in *The Australian* and *Australian Communications*.

**AUSTRALIAN**  
**communications**  
The Data and Telecommunications Management Magazine

## International Advertising Representatives

**Head Office**  
**AUSTRALIA & NEW ZEALAND**  
Australian Communications  
4/541 Kent Street  
Sydney NSW 2000  
Australia  
Ph (02) 264 2200 Fx (02) 264 2244

**USA & CANADA**  
M&T International Marketing  
Miller Freeman Inc  
411 Borel Drive Avenue  
San Mateo CA 94402  
Ph (415) 358 9500 Fx (415) 358 9739

**EUROPE**  
A-Z International Sales  
70 Chalk Farm Road  
London NW1 8AN  
United Kingdom  
Ph 71 284 3171 Fx 71 284 3174

**JAPAN**  
Media Sales Japan Inc  
Tamuracho Building  
3-3-14 Shimbashi  
Minato-ku Tokyo  
Japan  
Ph 3 3504 1925 Fx 3 3595 1709

**TAIWAN**  
Acer TWP Corp  
4F 19-1 Lane 231  
Fu Hsing N. Road  
Taipei 104  
Taiwan  
Ph 2 713 6959 Fx 2 715 1950

**KOREA**  
Jes Media International  
5th Floor Banpo Building  
40-7 Chamwon-Dong  
Seocho-Gu Seoul 137-030  
Korea  
Ph 2 545 8001/2 Fx 2 549 8861

**HONG KONG**  
Acer TWP Corp HK  
Unit 2, 5th Floor  
82-84 To Kwa Wan Road  
Kowloon  
Hong Kong  
Ph 764 3857 Fx 764 3857

**SINGAPORE**  
Eastern Publishing Associates  
1123 Serangoon Road #03-01  
Singapore 1232  
Ph 296 6166 Fx 298 7551

**ISRAEL**  
Nora Lifton  
Kfar Saba 44444  
Israel  
Ph 52 970065 Fx 52 953194



# X.25 — Reports of its Death Greatly Exaggerated

X.25 technology may now be reaching a venerable age, but it continues to maintain a large share of the data comms market. And with new growth in the Asia-Pacific region, its future looks secure.

The most recent technical developments invariably attract the attention of the vendors and users and therefore the majority of marketing activity. This can happen regardless of any proven need or application for the new innovation. Our industry often seems to criticise or ignore technology which has been with us for some time. The latter has happened over the years with packet switched networks and the X.25 standards upon which these networks are based.

Yet manufacturers and vendors of X.25 switches report undiminished demand for their products. Demand is steady in both public and private networks with global shipments of X.25 equipment estimated at around \$1.7 billion this year and growing at about 10% per annum. These figures are supplied by Northern Telecom, a major switch supplier, and are quite remarkable for a technology which the CCITT first specified in the early 1970s.

The X.25 Packet Switched Public Data Networks (PSPDNs) such as Telecom Australia's Austpac network are used for most of the world's EDI, EFT, POS, e-mail and public database access applications. Currently Austpac has over 12,000 access ports, made up of the older SESA switches, supplemented by the more recent NorTel DPN-100s. There are over 30,000 regular users of Austpac. The high ratio of users to ports is due to the significant number of dial-in users and multi-access EFT/POS lines coming in via controllers. While the above applications are mainly inter-organisation, X.25 also has a significant share of the intra-organisation networking marketplace, between servers, large computers and LANs. This is evidenced by the fact that companies such as Cisco, Wellfleet, SynOptics and Novell do not consider their products complete unless X.25 interfaces are available across the range.

The detractors of X.25 may say "These figures are just for the European marketplace," but they ignore the lower, but still steady sales in the United States where X.25 equipment is estimated to have 21% of the wide area private data network market. The lower usage of public X.25 networks in the US is more a result of telecommunications regulations, history and pricing than any inadequacy in the technology. X.25 equipment sales in the Asia-Pacific market are booming (see 'X.25 in the Asia-Pacific Region' on page 90).

All this X.25 activity seems to be against all the market hype surrounding newer products. To understand this continued interest in packet switching we need to look at how X.25 operates, its benefits and shortcomings, and how it relates to other technologies such as frame relay, ISDN and IP.



## Robustness Counts

X.25 is a networking protocol which operates at the lower three levels of the International Standards Organisation's 7 layer OSI model only (see 'X.25 in Summary' on page 88). Note that X.25 performs error checking functions at layers two and three.

The combination of sequence and error checking between devices by LAPB (layer 2) and the packet headers (layer 3) end-



## X.25 in Summary

In a typical X.25 network computing devices referred to as Data Terminal Equipment (DTE) are connected to switches or Data Circuit Equipment (DCE).

DTEs are connected in two ways. Computers with native X.25 interfaces are connected in 'packet mode,' which means they divide the data they have to transmit into packets before sending and assemble packets into data blocks after receipt.

Packets vary from 16 to 4K characters, but are typically 128 characters which are called octets (8 bit bytes). In this way, a 1K block of file transfer or user screen layout would become 8 separate 128 octet packets for transmission through the network. An X.25 header is placed at the front of each packet identifying the conversation which this packet belongs to and its sequence number. The switches move the packets through the network, in sequence, to the destination DTE.

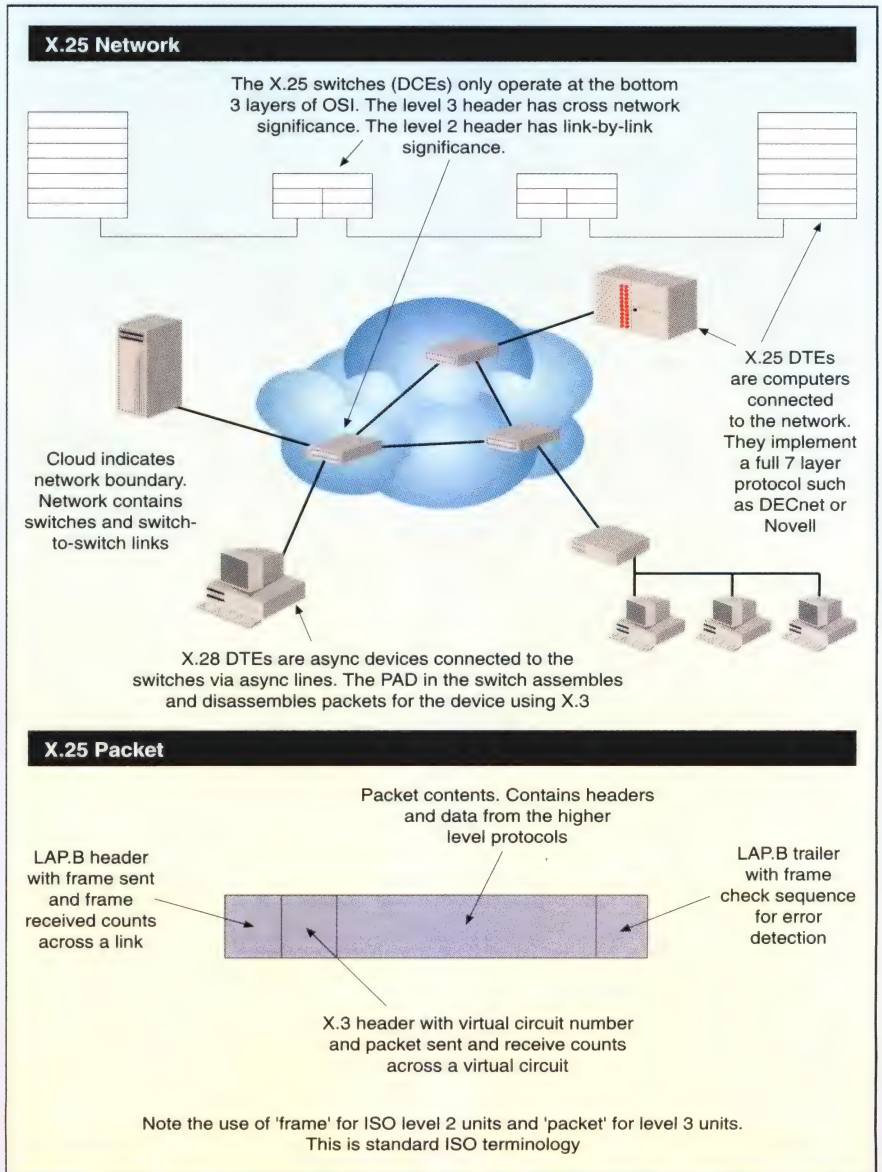
There is also provision made for the millions of simple asynchronous character mode (RS232) devices in the world. Recommendations X.3, X.28 and X.29 specify a Packet Assembler Disassembler or PAD function. The PAD communicates to the connected character mode device in simple IA5 characters, assembles outgoing characters into packets with headers and also disassembles incoming packets into strings of characters for the terminals. IA5 stands for 'International Alphabet 5' but is better known as ASCII which is the American Standard Code for Information Interchange. There are minimal differences between the two, mainly in codes for pound and dollar signs.

X.25 is a 'connection oriented protocol' because there is a conversation set-up stage where a virtual circuit is established. This is followed by a data transfer phase, and terminated by a call clear stage. The virtual circuits operate end-to-end (DTE-to-DTE) across the network, and there is one virtual circuit operational for each computer-to-computer conversation. The concept of a virtual circuit ensures that the other end DTE is operational before transfer of data begins. The virtual circuits num-

ber the sent and received packets across the network which ensures packets are not lost or duplicated during the data transfer phase and packets are kept in sequence. There is also flow control at the virtual circuit level to ensure there are only a set number of packets outstanding on one vir-

tual circuit at one time. This prevents one end DTE from overrunning the other end DTE and prevents network congestion.

As well as virtual circuit control across the network, X.25 uses a version of High Level Data Link Control (HDLC) called Link Access Protocol Balanced (LAPB) to



ber the sent and received packets across the network which ensures packets are not lost or duplicated during the data transfer phase and packets are kept in sequence. There is also flow control at the virtual circuit level to ensure there are only a set number of packets outstanding on one vir-

to-end over a complete virtual circuit means X.25 is often considered a 'belt and braces' approach. This double checking places an extra workload on the switches and has performance considerations. This is not a major concern today as small switches capable of processing 200 or more packets per second are common, and larger switches can process over 10,000 packets per second.

The result of this extra processing is that many users appreciate the safety that X.25 gives them, particularly for networks with

many switch-to-switch hops, slow lines, or lines subject to transmission errors. Australia Post refers to its network as 'robust,' a compliment to a network it relies on to deliver customer service. The Australian Tax Office is a long term X.25 user, as are BHP and Australian Defence.

The major Australian banks have large SNA networks for their branch terminal networks because SNA is optimised for remote terminal access to centralised databases. The same banks use X.25 for EFT/POS

applications because it suits occasional remote access from many users, with variable quality access lines. These banks also use X.25 internationally. A medium sized Australian bank is currently installing a new X.25 network.

Multinational companies with worldwide networks such as Chase Manhattan Bank and many government departments use the technology. The international airlines network (SITA) is mainly X.25 as is the international banking network SWIFT.



carry the packets between DTEs and DCEs. LAP.B uses a longitudinal parity technique called Frame Checking Sequence (FCS) to detect and correct transmission errors between DTEs and DCEs.

While X.25 does not specify switch-to-switch (DCE-to-DCE) operation, all available switches on the market offer this feature. There is also a system of frame numbering for both sent and received frames to enable sequence checking and flow control on the DCE-to-DTE link. The flow control is to prevent congestion by the total number of virtual circuits on any one link. Note that the virtual circuits on one link may be all for different DTE-to-DTE connections.

Because LAP.B operates on a link-by-link basis, it conforms to OSI's Data Link function at layer two, while the X.25 virtual circuit headers, which have a cross network responsibility, conform to OSI's Network function at layer three.

LAP.B at level two of X.25 is a development of HDLC and is the foundation for LAP.D and LAP.F, which are the level two protocols developed for ISDN and frame relay. LAP.D implements a more complex addressing structure to handle the multiple channels on an ISDN link. LAP.F implements the LAP.D addressing structures but does not use the frame numbering for flow control and sequencing. Hence frame relay discards packets when congestion or transmission errors occur.

LAP.B is also the basis for the Point to Point Protocol (PPP), which is the latest level two protocol specification for running TCP/IP on point to point lines.

IBM's Systems Network Architecture (SNA) uses Synchronous Data Link Control (SDLC) as its layer two protocol and this is another variant of HDLC. This enables most switch, router and computer vendors to use the same circuit designs (which include a HDLC/SDLC chip) for these protocols — they just vary the microcode depending on which network protocol is being used at the time.

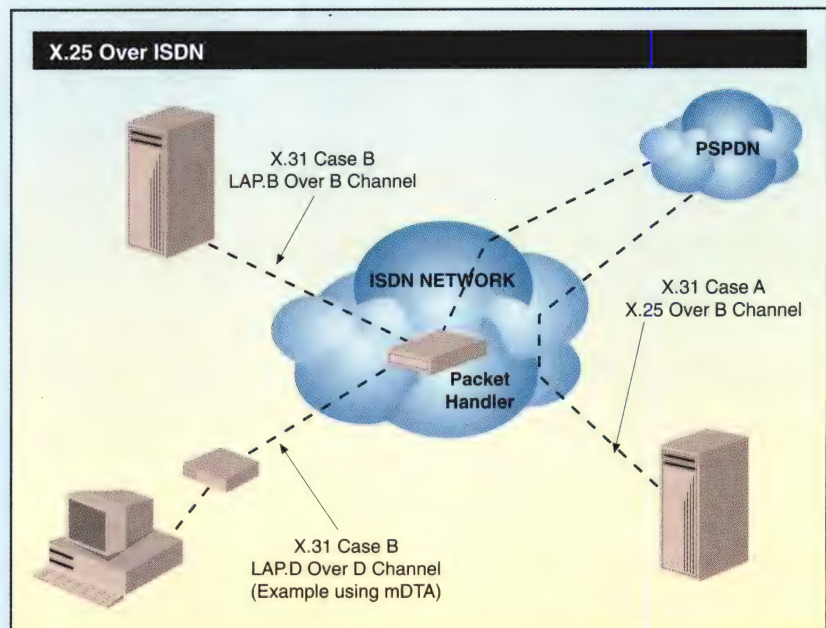
**Kevin Slatter**

The resilience and predictable performance of X.25 are the main reasons for this use, however there are other advantages.

## X.25 and IP

The US Department of Defense uses TCP/IP running over X.25 extensively, as do many other organisations. This overcomes one of the main problems with Internet Protocol (IP) style networks such as TCP/IP. In IP, the sending and receiving addresses are included in each packet header. This

## The ISDN Connection



X.31 is the CCITT recommendation for the operation of X.25 over ISDN, and this facility will soon be available in Australia. X.31 gives two options, Case A which is called minimum integration, and Case B which is full integration. With Case A the ISDN 64Kbps Bearer (B) channels are used as the transmission path between the X.25 DTE and the packet switched network, and standard X.25 over LAP.B is used. This is a simple approach and breaks no new technical ground.

X.31 Case B is a much more interesting scenario, as the ISDN network actually contains a Packet Handler (PH). As in Case A, a 64Kbps B channel may be used to access the PH, and LAP.B is the level 2 protocol used. Also in Case B is the ability to use the D channel for X.25, and to do this LAP.B is replaced with LAP.D as the layer 2 protocol.

The ISDN D channel is normally used for call signalling. Call setup and connection messages for the B channels are passed over the D channel in LAP.D frames. The control field in a LAP.D frame contains a Terminal Endpoint Identifier (TEI) which identifies the terminal on the ISDN S Bus which this frame is being transmitted from or sent to. Also in the control field is a Service Access Point Identifier (SAPI) identifying the ISDN service being used. A SAPI value of 16 identifies X.25 traffic on the D channel. There is a maximum X.25 packet length of 260 octets on the D channel which may be smaller if specified in ISDN parameter N201.

The D channel is 64Kbps on a Primary Rate Interface (PRI) which has 30 B channels. There should be no congestion

problems using around 50% of the D channel's 64Kbps, in bursts, for X.25 packets. Volume users however, are advised to use a B channel.

Of great benefit to smaller users will be the D channel on the Basic Rate Interface (BRI). The BRI has two B channels and one 16Kbps D channel. A BRI may be broken out from a PRI on the user's premises, or delivered to the customers site by the PTT, such an example is Telecom Australia's Microlink service.

Telecom Australia is currently trialling, and will shortly release, a D channel service. This will be aimed primarily at the small business, branch office and private user who will be using the BRI. Applications targeted for this service include EFT/POS in retail outlets, remote data base access, e-mail, EDI — in short, any low volume user. Future applications include remote burglar and fire alarm reporting and low volume digital fax.

To make this service as easy as possible for customers to use Telecom will supply an interface device from CTEC (Frenchs Forest, NSW). This device, called a miniature D channel Terminal Adaptor (mDTA), acts as an X.3 PAD for X.28 style access. It is only 110mm long, has an RS-232 plug for the terminal and an RJ-45 connection for the S bus. Supported data rates are 300 to 9,600bps for the terminal, the mDTA adapting this to the 16Kbps S bus speed.

Pricing for this service should be just over \$1,000, plus X.25 packet charges. Optionally, the customer can select an all-inclusive service for under \$2,000.

**Kevin Slatter**



## X.25 in the Asia-Pacific Region

Of the global \$1.7 billion in X.25 equipment sales each year, a significant proportion is going into the Asia-Pacific region. Australia, Japan, New Zealand, Singapore, Hong Kong, Japan, Taiwan and Malaysia have long had these networks, and they are being expanded.

New public networks are being installed in Indonesia, the Philippines, Korea, Papua New Guinea, Thailand, China and Brunei. China is actually installing several X.25 nets; one national network and a network in each province (such as Guangdong). Vietnam and other countries not included are currently expanding basic infrastructure and will consider X.25 networks at the next stage.

Many of these countries have a low number of telephones for their population and simply do not have the bandwidth available to give large users dedicated data transmission lines between regions and provinces. (Although the problem may not apply to international links to the capitals and links to major business centres.)

Outside the capitals, many population areas of several thousand people are often poorly served, with capacities of less than 2Mbps commonplace — very much lower than Australia, New Zealand, Japan, Singapore or Hong Kong.

X.25 offers a solution to this problem via a switch located in regional centres and given a dedicated 64Kbps or lower speed link back to the capital or main switching centre. This allows all data users in that region a data service to other regions using a shared X.25 link. One shared X.25 link being used at 20 to 30% of its capacity is more economic on precious transmission resources than multiple dedicated links being used at an average 5 or 10% of their capacity. The users gain a service they would otherwise not be able to obtain, and at a lower cost than a dedicated link.

These countries also experience some degradation in their transmission networks during inclement weather and national disasters such as floods and earthquakes. Most of the transmission systems are satel-

lite or microwave, with some copper and radio distribution. The newer systems are digital, with still a degree of analogue. X.25, due to its robust nature, can handle lower transmission speeds and higher bit error rates than many alternatives, and is hence the preferred network protocol.

A further benefit of X.25 to Asian markets is the ability to run multiple concurrent computer protocols such as SNA, TCP/IP, DECnet etc., as well as async terminals using X.3 PADs over the public X.25 network. This also applies to private companies, and many organisations such as banks and oil companies are operating or building X.25 networks.

As these countries build their telecommunications infrastructures, X.25 will play a significant part in data networking. It will be many years before they have the bandwidth availability and transmission quality that many Western countries take for granted. And it's only then that the growth in X.25 usage will start to slow.

**Kevin Slatter**

makes for a minimum header size of 20 octets in TCP/IP, 30 octets in Novell IPX, and larger in OSI IP. This compares to 3 octets for the X.25 data packet header, where only 12 bits are used for a virtual circuit number instead of addresses.

This larger IP header is not an issue when sending packets of 256 octets and above, as the header is only a small overhead. There are two situations where packet sizes of 128 octets or less are desirable, and this makes the 3-octet X.25 header a much lower overhead.

The first is where error rates on lines are high and a small packet size reduces the probability of an error. It also reduces the length of the packet retransmission as a result of any errors. The other situation is where many switch-to-switch hops are involved, or the lines between the switches are slow. A large packet takes longer to transmit on each hop. The total cross-network time, adding all hops, can be beyond user patience or beyond the time-out requirements of the computer application. Breaking a large IP packet into smaller X.25 packets

allows overlapped transmission of packets, and shorter cross-network times. Overlapped operation is where packet #1, the first 128 octets, is being transmitted on a switch-to-switch hop, while the second packet is being transmitted from the computer to the network.

### X.25 for Multiprotocol Nets

X.25 is simply a network protocol, and it's therefore necessary to run a suite of higher level protocols when not running asynchronous terminals through PADs. Proto-

In the September edition of

**AUSTRALIAN**  
**communications**

### PORT SWITCHING HUBS

Virtual workgroups, which allow employees to team up without regard to physical location are well on the way to reality. Next month we examine in depth the new generation of port switching hub hardware which is helping to make this new networking vision possible.

### CDPD

Cellular Digital Packet Data — CDPD — is a new acronym for the industry to absorb. It is a new mobile wireless digital data technology being developed by a consortium of American cellular operators and next month we examine the technology and importance.

### SNA INTERNETWORKING

The great unification of corporate networks is bringing the SNA-TCP/IP culture clash out into the open. In our next edition we take a close look at the technical issues involved in integrating Systems Network Architecture and TCP/IP backbones.

### AUSTRALIA AND THE INTERNET

As the Internet continues to grow at a phenomenal pace pressures are mounting overseas for its commercial exploitation. But in Australia, pressures are mounting to simply have access. Next month we explore the Internet and how Australian users can gain access.

Advertising Enquiries:

**Craig Burkil**  
**(02) 264 2200**



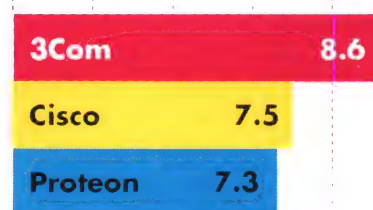
# Surveys show we have the world's best internetworking products. They also show you've never heard of them.

## Reliability



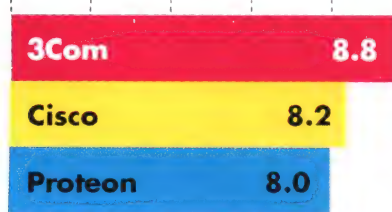
*In a recent Buyers' Scorecard Survey by Computerworld magazine, network managers rated leading bridge/routers. 3Com's NETBuilder® was rated Most Reliable, ahead of the market leader.*

## Responsiveness of vendor service



*In fact, NETBuilder got the highest ratings in 11 of 14 categories. That included Value, Physical Design, and Responsiveness and Quality of Vendor Service and Support.*

## Performance



*The Computerworld survey also rated NETBuilder highest for Performance. In another recent study — this one by Harvard University — NETBuilder II was 60.1% faster than the nearest competitor for FDDI routing.*

Most network managers know 3Com for adapters only. That's too bad, because both experts and users say our NETBuilder family of bridge/routers is the best in the business.

Computerworld asked 20 NETBuilder users if they would buy the product again, and 20 out of 20 said yes — an unprecedented customer loyalty of 100%. It's no wonder that last year *Systems Integration* magazine rated NETBuilder one of its "Products of the Year."

3Com internetworking products can make life better on your Ethernet, FDDI or Token Ring network. Just call (02) 959-3020, ext. 22 for more information.

3Com, Pacific House, Third Avenue, Globe Park, Marlow-on-Thames, Bucks SL7 1YL.  
©1992 3Com Corp. (408) 764-5000. 3Com, NETBuilder and Networks That Go the Distance are trademarks of 3Com Corp. ©1992 by CW Publishing, Inc., Framingham, MA 01701 — reprinted from *Computerworld*, May 18, 1992.



**Networks That Go the Distance™**



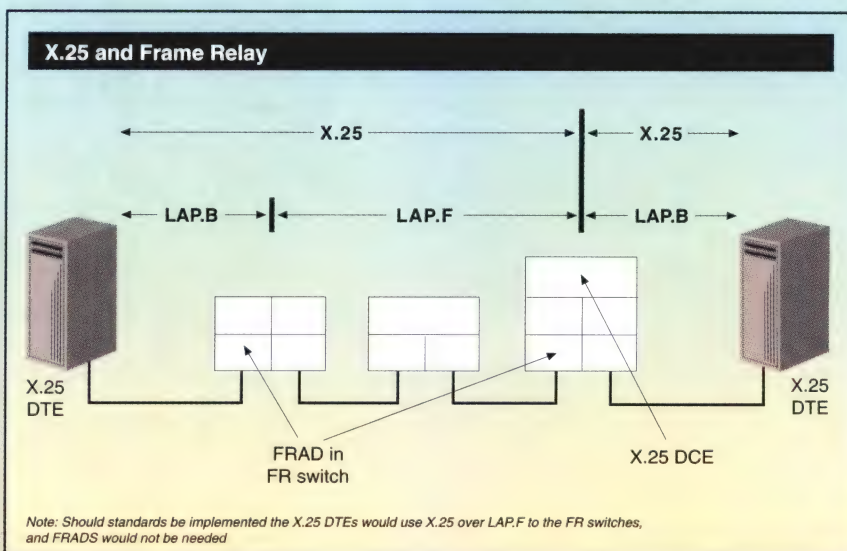
## X.25 and Frame Relay: Together at Last?

X.25 and frame relay are often seen as competitive technologies. But this is not strictly correct, as each has different strengths and weaknesses. Frame relay does not place a heavy workload on switches and is therefore faster. The downside is that frame relay does little error detection or correction.

Frame relay discards frames which have transmission errors and does not require their retransmission; it relies on the computer systems at each end to recover from the errors. Frame relay also discards frames when network congestion occurs and is not efficient on lines with high error rates, as too much time is taken retransmitting data end-to-end across the network.

Frame relay is also inefficient on slow lines because it takes a long time for the end systems to realise an error has occurred. By the time cross network retransmission has occurred the computer application has timed out or the user lost patience. X.25 does not have these problems, as it performs error detection and error correction as well as flow control on a link-by-link basis — hence the high processing load on switches.

Many networks today have a mix of high speed, high quality lines and low speed variable quality lines. These networks can use a combination of X.25 on low speed lines and frame relay on high speed lines. Q-Net in Australia runs just such a hybrid network, utilising Netrix switches which can be configured on a port-by-port basis for either protocol. Most X.25 switches on the market have this capability as frame relay is easily implemented by removing the sequence and



window error checking from X.25 and adding the frame relay addressing and congestion features.

X.25 packets are carried over frame relay by connecting the X.25 lines to frame relay FRADs in the frame relay switches. A FRAD is a Frame Relay Access Device and simply puts the X.25 layer three packet in a frame relay layer two frame. Frame relay is a layer 2 technology, and the LAP.F of frame relay simply replaces the X.25 LAP.B. This is the same approach taken to transport SNA or TCP/IP on PPP over frame relay.

The benefit of doing this is that the X.25 cross network checking is implemented at the end nodes of the network. X.25 is thus used to recover from errors not corrected in a normal frame relay im-

plementation. The problem with doing this is that there is no standard way of performing the X.25 FRAD function. This means there is a variance in the different vendor implementations.

There is much interest in the international standards community in standardising X.25 over frame relay. The Europeans appear to be in favour as they are significant X.25 users, but the Americans are not enthusiastic. Hopefully this will be resolved shortly. An example of how this can be achieved is shown in the diagram, with X.25 processing occurring at one node in the frame relay network. Some ideas in this example are taken from a paper produced by Telecom Australia Research Laboratories on the subject.

**Kevin Slatter**

cols regularly run over X.25 include SNA, DECnet, TCP/IP, Novell IPX/SPX, OSI and proprietary implementations such as Burroughs or Wang Network Architectures. It is these higher level protocols which give

the computing equipment the functionality to perform operations such as file transfers, cross computer log-ons, and mail.

Many operators of private networks, or users of public networks, see this as a major

benefit of X.25. One line from a computer or gateway to a switch, and only one line between switches can be used to run multiple higher level computer-to-computer protocols and multiple concurrent comput-



*Networking  
by Dataplex*

Call us,  
We'll send the brochure  
(03) 210 3333 (02) 349 3911 (06) 285 3657

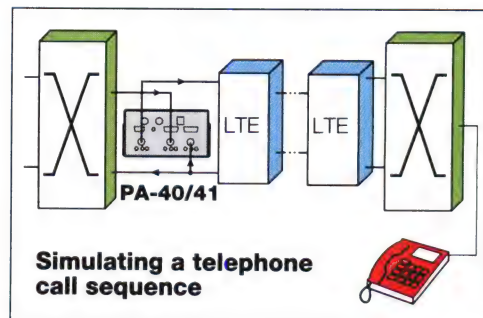
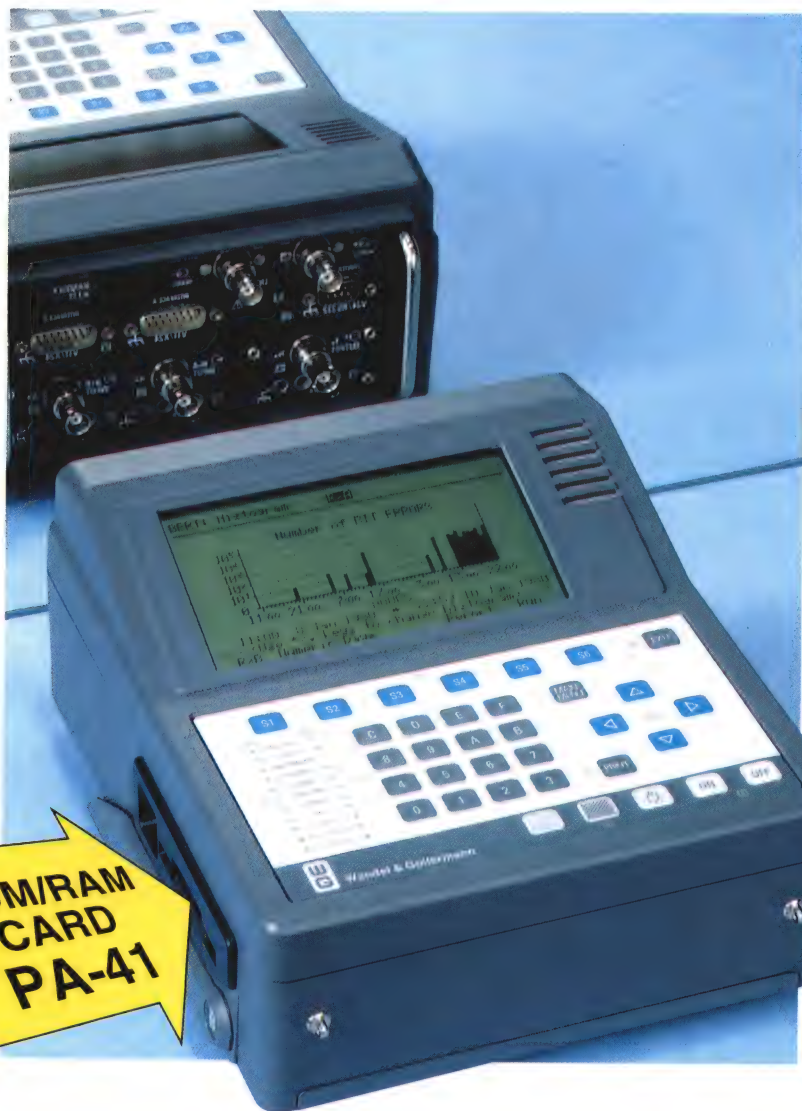
Local, Wide Area and Switched Networks

**Dataplex**

DPX 185 F



# Simultaneous Bi-directional Frame & Signalling Analysis



PA-40 Frame Analyzer and PA-41 Frame/Signalling Analyzer are field service instruments designed for commissioning, maintaining and troubleshooting 2 Mbit/s circuits. They are combined frame and signalling analyzers and each instrument has two receivers (2Rx) allowing both directions of a 2 Mbit/s circuit to be monitored simultaneously. Each instrument also has one transmitter (1Tx).

PA-40 offers a wide range of applications, including:

- Framed monitoring in both directions simultaneously
- Framed end-to-end testing
- Drop and Insert testing
- Channel Associated Signalling simulation and analysis
- Multiplexer/Demultiplexer testing
- Digital Cross Connect testing
- Automatic Protection Switch testing
- Unframed end-to-end testing

PA-41 provides all the PA-40 applications plus it has a RAM/ROM card interface which provides:

- The capability for application software, e.g. Common Channel Signalling No. 7 (CCITT Rec. Q.700 series Blue Book TUP) protocol analysis software, to be loaded into the instrument
- Additional storage for test results and instrument set-ups

**Wandel & Goltermann Pty Ltd**  
42 Clarendon Street  
South Melbourne Victoria 3205  
Tel: (03) 690 6700  
Fax: (03) 690 6750

**CCS  
No. 7**

**Wandel & Goltermann**  
Electronic Measurement Technology





er-to-computer sessions. Many private networks are cost justified on the basis that one line, say 64Kbps between Melbourne and Sydney, running multiple protocols over X.25, is faster and cheaper than multiple 9.6Kbps lines strung between these business centres running only one higher level protocol each.

There are management and operational benefits from running only one WAN protocol at the lower levels. There are further cost savings as any redundancy in back-up lines and network equipment can be used for all higher level protocols in the network. This saves installing back-up lines for each of the higher level protocols such as SNA, TCP/IP and Novell.

### **X.25 and the ISO**

It is frequently reported that X.25 is used over many LANs in Europe. It is not actually X.25 that is being referred to, it is the OSI equivalent covered in ISO standards 8880 Part 2, 8208 and 8881 for layer three, the network layer. 8880 identifies both a connection oriented and connectionless protocol. The connectionless protocol, fully covered in ISO 8473, is a development of the Internet Protocol (IP) from the TCP/IP set, with more features and longer address capability. There is provision in 8880 Part 3 for

the operation of 8473 over X.25, in the same manner TCP/IP can operate over X.25.

ISO 8208 is the connection oriented class and is a development of X.25. The 8208 standard has a DTE-to-DCE mode which is identical to CCITT X.25. There is also a DTE-to-DTE mode which allows the direct connection of computers without switches between them. This was developed because the CCITT version is asymmetric in operation, meaning some control message formats vary whether they are going from the DTE or DCE.

The third variant, covered in ISO 8881, is X.25 (8208) for operation over LANs. This has some variations on the DTE-to-DCE mode as it includes broadcast call set-up packets. Call establishment packets, which go from computer to switch in the CCITT usage, are broadcast over the LAN in OSI, to the relevant IEEE 802.2 address, which replies with a call connection packet.

These different ISO versions are commonly used in Europe because of the advantages to be gained from operating one common protocol at level three in the network. Two computing devices may be communicating over several LAN segments as well as WAN links and/or PSPDNs and will have the same error checking and flow control across the network.

### **The Way Ahead**

X.25 is not the answer to all problems and environments. It is best suited to bandwidth applications of 64Kbps and below, due to the processing loads on switches at higher access speeds. Also, the higher bandwidth services such as 802.6 MANs, ATM, B-ISDN and frame relay have lower residual error rates than many low speed lines and do not need the extra error checking.

There are many users who do not need or cannot cost justify a high bandwidth service. There are also many locations where these are not available, and may not be available for many years. This explains X.25's ready acceptance by less developed countries, low volume users and users with variable line quality.

X.25 also has its place in multi-vendor networking. The result of these influences is that X.25 will have a place in the wide area networking market, alongside ISDN, frame relay, IP and other technologies for many years to come.

*Kevin Slatter is an independent data communications consultant based in Sydney, NSW. He conducts regular courses on X.25 and other communications technologies for Housley Computer Communications.*

## **How to be in two places at the same time**

You slip away from your desk for a moment just as an important call you've been waiting for all day comes in. The receptionist apologises that you can't be found, and takes a message. This is where Ascom Tele-Nova can solve your internal communication problems. Ascom Tele - Nova is a

world leader in on - site computer based communication systems.

From the simple bleeper to data and full two - way speech pagers, these easy - to - grasp pocket units can improve office efficiency by up to 20%. So call Ascom Tele - Nova today and we'll show you a system or three!



Tone only



Tone and data  
Simulated display



Data and full  
2-way speech

**Ascom**  
**Tele-Nova Pty. Ltd** **ascom**

Ascom Tele-Nova products and systems telephone (02) 929 6599, or fax (02) 929 7140 or (008) 22 7284

DHA107



# Globalisation — Is the Medium the Munition?

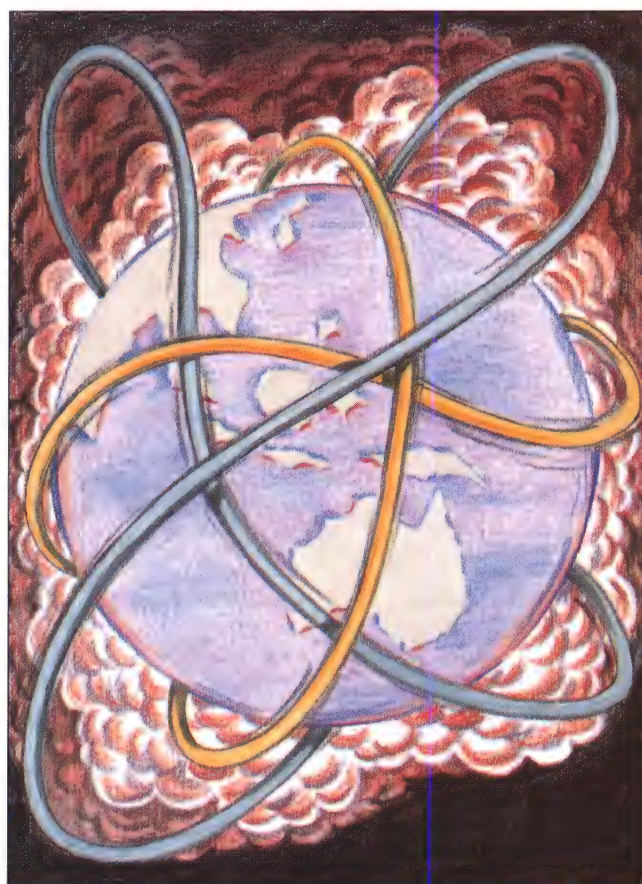
Dr Sam Paltridge argues that the recent explosion in undersea fibre optic cable capacity is a strong pointer to the way telcos are responding to the threat of global competition.

**I**t is currently fashionable to discuss the globalisation of the telecommunication industry. Exactly what globalisation means is a moot point. The notion that the ownership of public telecommunication operators (PTOs) is becoming more internationalised is commonly forwarded. Commentators focus on international investment by telcos in other PTOs and present laundry lists of past and prospective privatisations. Inherent in this analysis is the idea that ownership of PTOs is becoming more concentrated and that one day soon there will be a handful of global players. But are analysts looking in the right places for signs of globalisation?

In 1993 the telecommunication industry actually has less concentration of ownership than it did a decade ago. The reason is simple: the divestiture of AT&T split up not just the largest PTO, but the largest company in the world. Even with all the projected privatisations, and assuming PTOs are permitted to take substantive positions in all transactions, it is unlikely that the industry will reach the same level of consolidation for a long time (i.e. one carrier owning nearly half the world market for telecommunication services). Even if the Bell system was reconstituted tomorrow there would still be less concentration in some markets because of the emergence of carriers such as MCI and US Sprint. AT&T's share of national switched access minutes in the US has declined to around two thirds of the market. If NTT was divested, as currently advocated by some powerful interests in Japan, ownership concentration may devolve even further.

Privatisation may be a prerequisite for the further internationalisation of PTO ownership but is not akin to globalisation. PTOs in OECD countries operate around 90% world's satellite and submarine cable capacity and account for more than 80% of international telecommunication services, as measured by outgoing minutes of telephone traffic. These figures do not capture traffic handled by the private networks of large sophisticated users operating globally out of OECD countries. If there had been a significant trend toward the internationalisation of PTO ownership it would be expected to show up in these countries.

Yet of all the OECD countries to have privatised their main PTO only New Zealand, a county responsible for less than 0.3% of the world telecommunication services market, ceded majority ownership to foreign telcos. Moreover, the New Zealand Government requires that 51% of the company be eventually owned by Kiwis. Strategic control is often difficult to ascertain from an analysis of stock ownership. Japan takes a different view from NZ. When it privatised NTT, the Japanese Government initially barred foreign



investment. A recent report for the World Bank rationalised the policy in the following terms:

'Because Type-1 carriers constitute part of the fundamental infrastructure that supports people's lives and economic activities and serves national functions in securing important communications, such entities require due attention so as not to damage national independence and autonomy. Given the confined land area of Japan, the number of new entrants in such facilities-based



**Table 1: Cable and Wireless Worldwide Operations, 1992**

LOCATION	GROUP INTEREST%	SCHEDULED EXPIRATION OF LICENCE†	
		INTERNATIONAL	DOMESTIC
UNITED KINGDOM			
United Kingdom	100	2009	2009
United Kingdom	50	-	2016
ASIA/PACIFIC			
Australia	24.5	2016	2016
Fiji	49	2014	NSP
Hong Kong	58.4	2006	1995
Japan	17.7	-	-
Macau	51	2001	2001
Philippines	40	2002	2003
Solomon Islands	41.9	2003	2003
Thailand	40	-	2003
Tonga	100	2000	-
Vanuatu	33.3	2009	-
WESTERN HEMISPHERE			
Anguilla	100	2018	2018
Antigua	100	2012	NSP
Ascension Island	100	-	-
Barbados	85/75.2	2011	2011
Bermuda	100	-	-
British Virgin Islands	100	2007	2007
Cayman Islands	100	2011	2011
Dominica	100	2005	2005
Falkland Islands	100	2010	2010
Grenada	70	2013	2013
Jamaica	79	2013	2013
Montserrat	100	2007	2007
St Helena	100	2010	2010
St Kitts and St Nevis	69.9	2015	2015
St Lucia	100	2001	2000
St Vincent	100	2004	2004
Trinidad and Tobago	49	2009	2009
Turks and Caicos Islands	100	2012	2012
United States	100	-	-
MIDDLE EAST, INDIAN OCEAN AND AFRICA			
Bahrain	20	2031	2031
Diego Garcia	100	2011	-
The Maldives	51	1998	1998
Pakistan	80	-	2005
Seychelles	100	2010	2010
Sierra Leone	49	-	-
Republic of Yemen	65	1999	-

† Where no expiration year is specified in a licence, the expiration year shown above is the earliest year in which the licence is terminable by the host government, absent a default by the Group and its associated companies. For a full account of the operations and conditions of C&W involvement in these countries, refer Annual Report on Form 20-F 1991-92.

NSP = No Service Provided

Source: Cable & Wireless

† Where no expiration year is specified in a licence, the expiration year shown above is the earliest year in which the licence is terminable by the host government, absent a default by the Group and its associated companies. For a full account of the operations and conditions of C&W involvement in these countries, refer Annual Report on Form 20-F 1991-92.

NSP = No Service Provided

Source: Cable & Wireless

domestic carriers, is curious. The original foreign ownership restrictions based on this reasoning were rigorous. The four 'foreign attribute exclusion' provisions prohibited investment by: any person who did not have Japanese nationality; foreign governments or their representatives; foreign corporations or groups; and corporations whose foreign-capital ratio was over one third. The latter provision meant that a company that was 65% Japanese owned could not invest in NTT.

This rule was in line with Japan's Commercial Code which permits holders of more than one third equity to veto decisions '... thereby giving foreign capital a potentially substantial influence over corporate operations.' After pressure on NTT's share price, due to restrictions on the company's ability to rebalance its tariffs, this policy was revised.

Since mid-1992 foreign investment up to 20% is permitted for NTT. This is below the level determined by Japan to offer a foreign PTO strategic leverage in a situation where the Government still holds around 60% of NTT's shares!

The main point is that governments continue to strongly influence the pace of internationalisation of telco ownership. They view the telecommunication industry as too fundamental to overall national interest to opt out. Take the policy adopted by the Thatcher Government in the UK in relation to the privatisation of Cable and Wireless (C&W). It is often noted that there are no foreign ownership restrictions relating to investment in PTOs based in the UK. While true in itself, this does not give an accurate picture of the restrictions facing foreign investors. C&W's articles of association prohibit any investor owning more than 15% of the stock. Even if a PTO decided the quickest path to globalisation was taking over C&W, this is not possible.

Moreover the UK Government has a 'Special Share' which grants certain rights over C&W's corporate structure. For instance, Her Majesty's Government must consent to any disposal of the whole or material part of the company and its subsidiaries. Without any restriction on foreign ownership, C&W is perhaps one of the PTOs most impervious to take-over.

Set against other relatively competitive telecommunication services markets of the UK, Japan and the US, Australia's policy limiting foreign investment to 49% in its second telecommunication licence seems fairly liberal. In a number of countries, governments introducing competition have been willing to allow greater foreign investment in new carriers than existing PTOs. C&W was permitted to take a 17% position in IDC, one of Japan's international carriers, at a time when no foreign investment was allowed in NTT. Similarly Stentor has taken a 20% position in Mercury. BT may

industries as telecommunications must naturally be limited — necessitating that domestic carriers receive first priority as service suppliers.'

While few would quibble with the need to ensure national interest, the logic that small geographical areas prohibit facilities-based competition, or dictate priority for



be allowed to take 20% of MCI, but that is the maximum allowed by US regulations.

## Telco Strategies

In a capital-hungry industry it serves little purpose to be the sole owner of new ventures. The strategy of PTOs is clear: buy access to markets through strategic investments rather than an outright purchase of a carrier. In the rare exception that an existing carrier in an OECD country is for sale to foreign interests, such as Telecom NZ or Aussat, telcos form alliances. Yet from a national perspective the motivations for C&W selling a 20% stake in Mercury, or MCI offering 20% to BT, are far different from considerations relating to the potential sale of a strategic stake in Telstra.

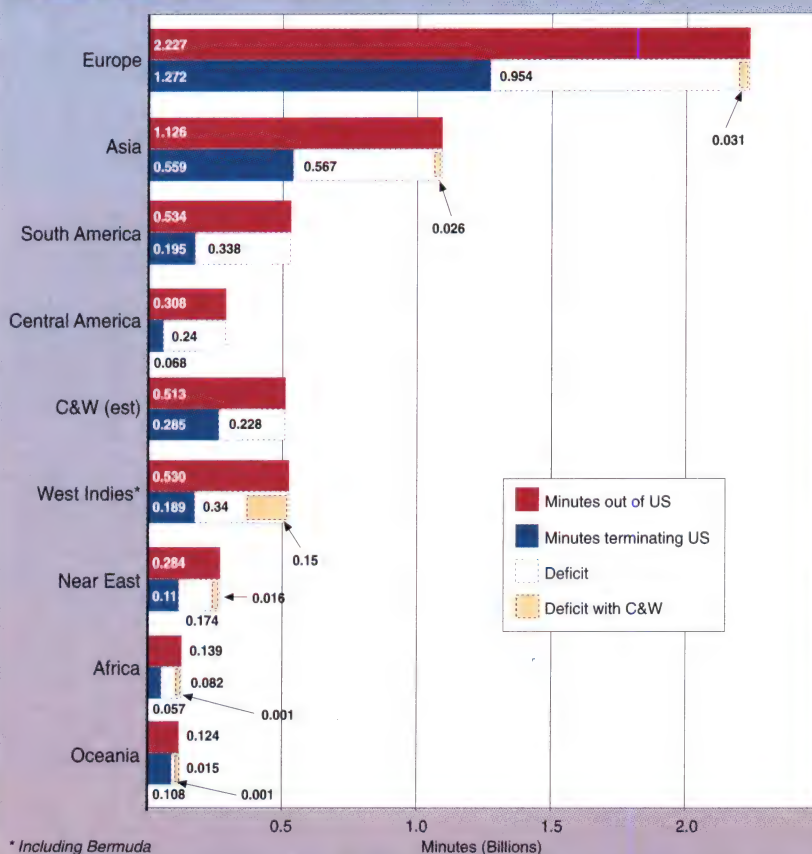
For C&W the sale to Bell Canada brings new investment capital and frees up funding for other ventures. It also facilitates greater cooperation between Mercury and Bell Canada for international services between the two countries. Just as C&W's participation in IDC has allowed it to carve out a larger share of UK-Japan traffic than might otherwise be expected of a company with a carrier at only one end, Mercury can look toward a greater share of the UK-Canadian market. It may also be significant that C&W did not seek a strategic partner in Mercury until after the end of the duopoly, effectively sharing any risk posed by increased competition. For Stentor, or Bell Canada, the Mercury acquisition provides the opportunity to learn more about the UK and a point of entry into the rest of Europe as liberalisation proceeds.

By way of contrast, the objective for selling a chunk of Telstra to a foreign carrier seems to be simply to boost the sale price. It is totally different from the globalisation strategy pursued by C&W.

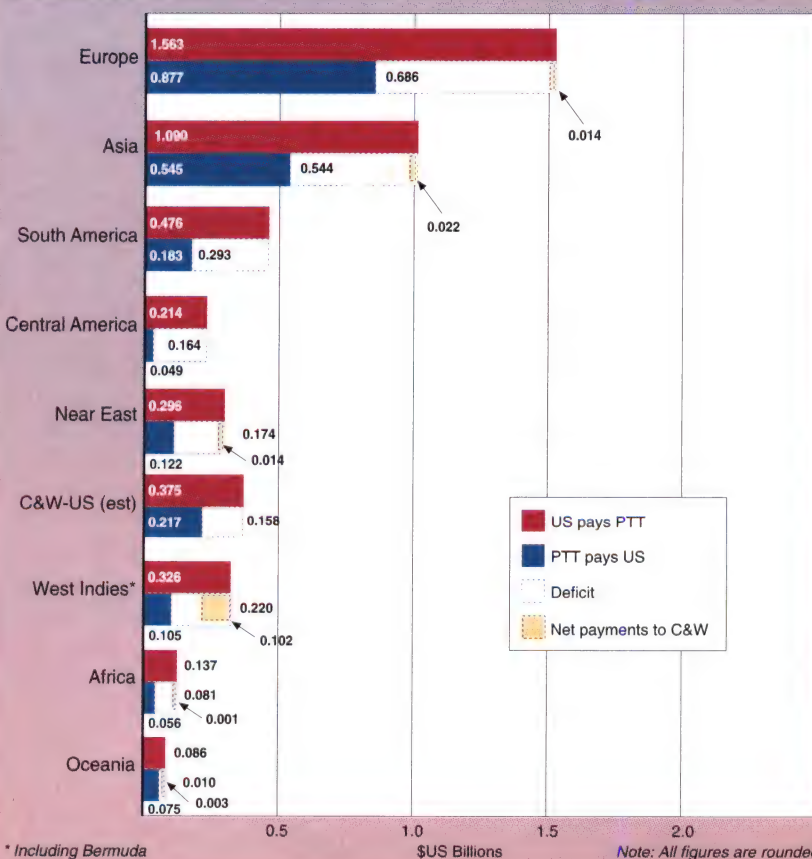
Whereas C&W's sale of a Mercury or Hong Kong Telecom (HKT) stake frees up capital for new acquisitions, the sale of a strategic holding in Telstra, while boosting Commonwealth coffers, may produce no new capital for international expansion. Moreover, while C&W clearly maintains strategic control of Mercury or HKT as the largest shareholder, a foreign PTO holding a 25% stake in Telstra would probably be the largest shareholder. The best argument for privatisation of Telstra is that it would have more efficient access to capital than under Commonwealth ownership.

But the objective of a foreign PTO investing in Telstra is to gain access to the Australian market. As such, it is not clear how such a stake would benefit Telstra's expansion in global markets. The controversial Salomon Brothers report suggested the presence of Singapore Telecom or AT&T as shareholders could enhance Telstra's valuation. Yet Singapore has often been claimed to be Australia's main rival as a regional hub, while AT&T is reportedly

**Figure 1: US Telecommunication Traffic Balance, 1990**



**Figure 2: US Telecommunication Financial Balance, 1990**





**Table 2: US Financial Deficit per Minute, 1990**

LOCATION	MINUTE DEFICIT	FINANCIAL DEFICIT (\$US)	\$US PER MINUTE
Oceania	13,707,893	8,015,778	1.71
West Indies†	190,273,638	118,215,670	1.61
Central America	240,439,955	164,344,649	1.46
C&W	228,281,672	158,183,580	1.44
Europe	922,929,491.6	671,324,922	1.37
South America	338,824,195	293,091,819	1.16
Asia	540,594,745.6	522,231,917.9	1.04
Africa	80,834,624	79,753,426	1.01
Near East	158,417,444	160,547,842	0.99
Antarctica	3,676	4,527	0.81
Total/Average*	2,714,307,334	2,175,714,131	1.25*

† Including Bermuda

Source: FCC Data

keen to enter Vietnam, where Telstra has a long-standing interest. This raises questions as to how vigorously such PTOs would want Telstra to pursue these markets if they were its largest shareholders. More likely, Telstra would take on a domestic focus, providing support as required to its strategic investors in foreign markets. C&W's relationship through its 58% shareholding in HKT is a case in point.

As a general policy of the C&W Group the majority of HKT's capital investments are made in Hong Kong, with the exception of submarine cables and satellites. HKT may participate in business opportunities or make investments elsewhere in the region when they are likely to generate particular benefits. An example is the investment made by HKT in China, aimed at boosting traffic levels between the two countries. C&W says it does not expect its own continuing investment in China, and the region, to come into conflict with HKT's business. Rather, C&W says consideration may be

given to joint participation in business opportunities in the region where it can be demonstrated as mutually beneficial.

The presence of a company such as Singapore Telecom or AT&T on Telstra's share register is clearly not a prerequisite for a globalisation strategy. C&W, a company with no strategic shareholding by another PTO, and no investor known to have more than a 10% shareholding, has been able to pursue one of the few apparently successful globalisation strategies. The suggested benefits of a foreign PTO taking a stake in Telstra are 'synergies of personnel and technology and investor perception.' All these can, of course, be achieved through alliances and joint ventures with foreign PTOs in global markets. None require a foreign PTO to have the largest strategic stake in Telstra.

To date, the national interest concerns of governments presiding over the world's largest economies have meant that limitations have been placed on the internationalisation of ownership. As a result, foreign

involvement in national markets is still relatively small. A different scenario is being played out in the developing countries, but these represent only a small percentage of the global market. Yet in terms of international services these countries are an essential element in marketing services to developed countries. There are clearly lessons that can be learnt from the experience of C&W since privatisation. Globalisation is about competing for international services between countries and this is dependent on access to those markets.

The telecommunication industry has always been about selling access to customers. C&W operates in over 45 countries and has monopolies in many (see Table 1 on page 96). Apart from the United Kingdom, the United States, Japan and Australia, licences generally give C&W the exclusive rights to provide services for a fixed or indefinite period. While many of these countries are small, monopoly provision of international service not only allows exclusive marketing rights in a country, but the sole right to sell that market internationally. It is that latter right, under the current accounting rates, that makes international telecommunication lucrative for PTOs in developing countries. Accounting rates determine the financial settlement between PTOs for network use if traffic is greater in one direction than another.

## There's No Accounting For Rates

It is not difficult to demonstrate that the pricing of international telecommunication bears little relationship to cost. Take, for instance, the price of a telephone call from San Francisco to London. In 1990 a one minute telephone call between these cities through AT&T (or MCI & US Sprint) could cost a subscriber around \$US1.20, depending on the time of day. From that price AT&T paid a number of charges to other

**Table 3: Trans-Atlantic Submarine Cable System Cost**

CABLE	YEAR	CAPITAL COST (\$US)	NOMINAL CAPACITY (VOICE GRADE CIRCUITS)	TOTAL CAPACITY (VOICE PATH)	COST PER VOICE BEARER CIRCUIT (\$US)	COST PER DERIVED VOICE CIRCUIT (\$US)
TAT-1	1956	49.58	36	89	1,377,222	557,079
TAT-2	1959	42.7	48	98	899,583	435,714
TAT-3	1963	50.6	138	175	366,667	289,143
TAT-4	1965	50.4	138	138	365,217	365,217
TAT-5	1970	70.4	720	1,440	97,778	48,889
TAT-6	1976	197.0	4,000	8,000	49,250	24,625
TAT-7	1983	194.6	4,200	8,400	46,333	23,167
TAT-8	1988	335.4	7,560	37,800	44,365	8,873
TAT-9	1992	405.0†	15,000‡	80,000	27,000	5,062
TAT-10	1992	300.0	22,680	113,400	13,228	2,646

† Includes \$US56m interest charges ‡ Minimum Assignable Unit of Ownership (MAOU)

Source: FCC





© 1993 AT&T

## AT&T SYSTIMAX Premises Distribution System.

It connects everything you can imagine.  
Even things you can't.

Imagine a wiring system that connects all the different systems that exist in today's buildings. Now imagine it can also connect systems that don't even exist. Yet. That's AT&T SYSTIMAX® PDS. It allows you to integrate equipment from vendors as diverse as DEC, IBM and HP. It even allows technologies like ISDN and FDDI to work together. Seamlessly. Transparently.

AT&T SYSTIMAX PDS is an advanced, modular, building wiring system with an open architecture that combines both copper and optical fibre with a 5/15 year assurance programme. With SYSTIMAX PDS, you're ready for everything you can imagine. And a lot of things you can't. No other system offers you greater flexibility. SYSTIMAX PDS. Call AT&T Network Systems at 008 804 738.

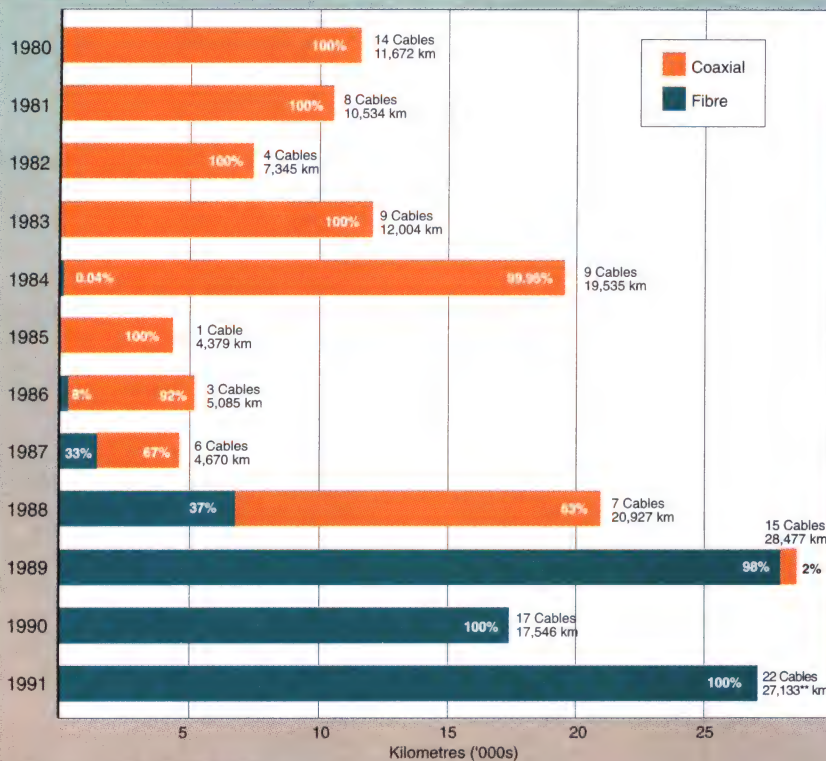


**AT&T**

Network Systems

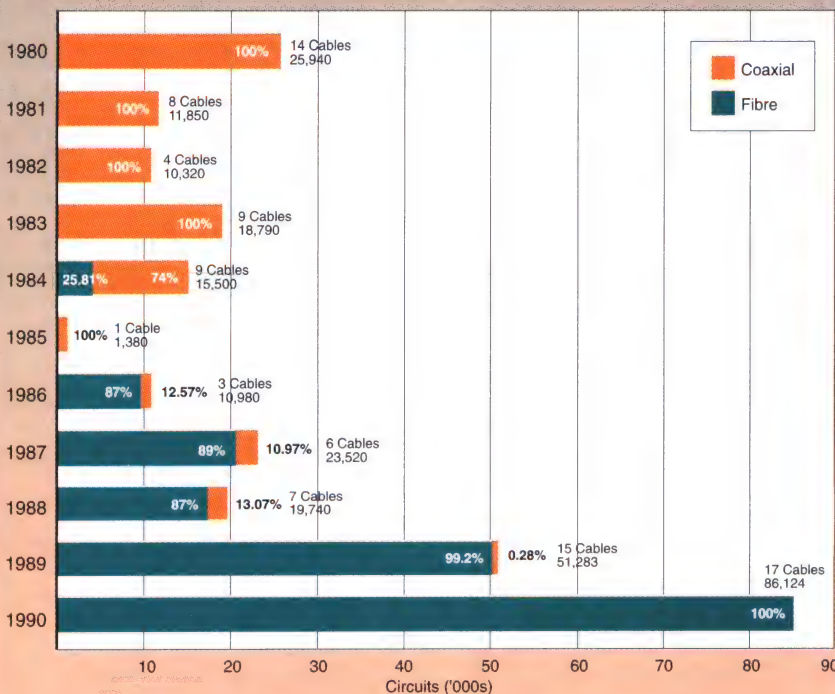


Figure 3: World Undersea Cable Additions\*



\* Excludes experimental and military cables  
\*\* Based on data for 17 cables

Figure 4: World Undersea Cable Circuit Additions



\* Data for 1988-1990 based on 14 cables for 1990, 13 for 1989 and 4 for 1988  
Data for coax cables set at maximum capacity of cable where different legs have varying capacities

At the same time the price of a trunk call between San Francisco and New York was nearly a third of that rate. Not only are accounting rates generally far larger than the longest trunk tariff for a country, but huge compared with national interconnect charges. Of course only a relatively small percentage of calls travel the maximum domestic distance. For much of the traffic, BT or Mercury are providing access for around \$US0.25 for what Pacific Telesis does for around \$US0.05.

Yet the accounting rates in existence between the US and UK are relatively low compared with other intercontinental rates. Some argue that the cost of providing infrastructure is greater in developing countries. Yet the rates existing between developed countries are often higher than with developing countries. In 1990 the accounting rate between the US and Hong Kong was more than 20% greater than with Vanuatu. Since that time the rate between the US and Hong Kong has virtually halved, but it is still twice that between the United States and United Kingdom.

Nevertheless much attention has focused on developing countries. One reason is that only around 25% of the US financial deficit was with other OECD countries in 1989. Yet with the addition of carriers outside the OECD area owned partly or wholly by carriers from OECD countries (including the US) the figure was over 50%. With the internationalisation of ownership in developing countries, PTOs are increasing their ability to sell market access to users in developed countries.

Based on estimated market share for countries in which C&W provides international telecommunication services, that corporate group is the third largest origin and destination for US telecommunication traffic when compared with the world's regions (in 1990 — 799,012,792 minutes compared to 3,499,513,467 minutes for Europe, the top ranked region). C&W is the most striking example of a 'first world' carrier internationalising. Although solidly based on the inheritance of the British Empire, the company has acted to retain and build on existing markets. From 1984 to 1992, nine licences were renewed, a further 11 licences replaced prior to their scheduled expiration and three new licences, in scope or territory, granted. Seven licences were not renewed or otherwise terminated. C&W is rapidly being joined by an increasing number of other PTOs from the OECD area. Examples include GTE's investment in the Dominican Republic, France Telecom and Southwestern Bell in Mexico, and a number of PTOs in Argentina.

While the US bemoans its growing traffic imbalance with the rest of the world, and the resulting financial deficit (now above \$US3 billion), it is important to note that US PTOs have significant shares in, or own,

carriers. The access charge to a local telephone company was around \$US0.05. The price of a satellite or fibre voice path between the US and UK was less than \$0.02 (i.e. via Intelsat or a TAT cable). In 1991 the

accounting rate settlement for one PTO in the UK stood at \$US0.53 cents. That meant the charge to the subscriber for using the AT&T link was around \$US0.60 a minute (excluding its half of the accounting rate).



## Why not get the WHOLE story on networking?

Whether it's FDDI, OSI, ATM, ISDN, SNA, Frame Relay, Fastpac, Token Ring or 10Base-T, you need to be on top of the rapid changes now taking place in the communications industry.

In the pages of Australian Communications, every month the region's top communications journalists, leading industry figures, academics, professionals and industry experts bring you the latest news and analysis on the technical, political and management issues facing this dynamic industry.

The time to subscribe is NOW! with savings up to 20% off the newsstand price.



### SUBSCRIBE NOW

☐ 22 issues, two years, for \$96 (save 20%)

☐ 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AUS\$ .....

☐ Bill my company Authorising signature .....

Charge my: ☐ Amex ☐ Diner's ☐ Visa ☐ Bankcard ☐ Mastercard

No ..... Expires .....

Name .....

Company .....

Address .....

..... Postcode .....

Signature .....

Post to: Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000

OR: Fax your application to us on (02) 264 2244



**Table 4: World Undersea Cable Investment**

YEAR	NEW CABLES	CABLES FOR WHICH COST DATA AVAILABLE	TOTAL COST (\$US) <sup>†</sup>
1980	14	9	488
1981	8	5	333
1982	4	3	235
1983	9	7	540
1984	9	9	710
1985	1	1	140
1986	3	2	217
1987	6	5	201
1988	8	7	905
1989	15	12	1,332
1990	17	13	632
1991 (Est)	22	15	1,149

<sup>†</sup> 1990 US dollars

Source: Analysis of NTIA data

**Table 5: Global Undersea Cable Expansion**

YEARS	INVESTMENT IN NEW CABLES (\$USM) <sup>†</sup>	NEW UNDERSEA CABLES (KM)	% OF UNDERSEA CABLE COVERED BY AVAILABLE INVESTMENT DATA	NEW CABLES
1980-1983	1,595	41,555	95%	35
1984-1987	1,268	33,669	97%	19
1988-1991	4,018	94,082	95% (est)	62

<sup>†</sup> 1990 US dollars

Source: Analysis of NTIA data

**Table 6: C&W Global Undersea Cable Expansion<sup>†</sup>**

YEARS	NEW CABLES	CABLE LENGTH (KM) <sup>‡</sup>
1977-1981	4	6,412
1982-1986	8	4,657
1987-1991	12	37,605

<sup>†</sup> Cables in which C&W has ownership for which data is available

<sup>‡</sup> Data available for 3,2 and 10 cables. This makes the 1982-1986 distance unrepresentative

Source: Analysis of NTIA data

**Table 7: Mercury Investment in Undersea Cables**

CABLE	IN SERVICE	INTEREST %
H-J-K	1990	2.12
NPC	1991	3.90
PTAT	1989	55 <sup>†</sup>
TASMAN 2	1992	1.81
TAT-8	1988	NA
TAT-9	1992	NA
TAT-10	1992	2.90
TAT-11	1993	20.98
TAT-12/13	1995/6	5.90
TPC 3/HAW 4	1989	0.80
UK-FRANCE 3	1989	25.0
UK-FRANCE 4	1991	40.0
UK-GERMANY 5	1991	10.71
UK-NETHERLANDS 12	1989	18.75
UK-SPAIN 4	1991	3.0

Other participation, planning or capacity purchases: UK-Belgium 6, UK-Netherlands 13, UK-France 5, UK-Nordic, Germany-Denmark, Denmark-Russia, UK-Belgium 5, UK-Ireland 1, UK-Denmark 4, TPC 4, HAW 5, PacRimEast, PacRimWest, APC, H-G-P and TPC 5

<sup>†</sup> Group interest

Source: Cable &amp; Wireless

many of these markets. In 1989 the US financial deficit with Mexico, in which Southwestern Bell is now a major investor, was nearly as great as for all 24 OECD countries. Again using C&W as an example, the estimated traffic balance between the C&W Group and the US represented the 5th largest deficit when lifted out of the world's regions (see Figures 1 and 2 on page 97). C&W is compared against regions because of the number of countries for which it provides services.

In times past the accounting rate system benefited PTOs at both ends of an international call. It might be suggested that lower accounting rates may have increased demand, but the primary casualties of high accounting rates were subscribers rather than PTOs. High accounting rates encouraged cooperative sharing of infrastructure and service provision. Whether by satellite or undersea cable the world's public telecommunication operators (PTOs) formerly provided infrastructure and services on an almost wholly cooperative basis. For many telecommunication systems cooperation

still plays a central role. However, with the increasing liberalisation of global telecommunication, competition is being introduced in network and services development. Increasingly, PTOs are providing services at both ends of an international link and in some cases using independent satellite and cable transmission systems. For instance, in 1992 Mercury Communications has operating agreements with 41 PTOs, of which 13 were part of the C&W group or associated companies.

Essentially, what PTOs such as AT&T have realised is that accounting rates are helping to fund the global expansion of competitors such as C&W. In 1990 for every deficit minute a US PTO had with a Cable & Wireless destination it paid an estimated \$US1.44 (see Table 2 on page 98). In total this amounted to an estimated \$US158 million paid to the C&W Group, or around 10% of the intercontinental deficit. In 1990 this was nearly three times the settlement paid to Japan's three international carriers, around four times the settlement with France Telecom, five times the settle-

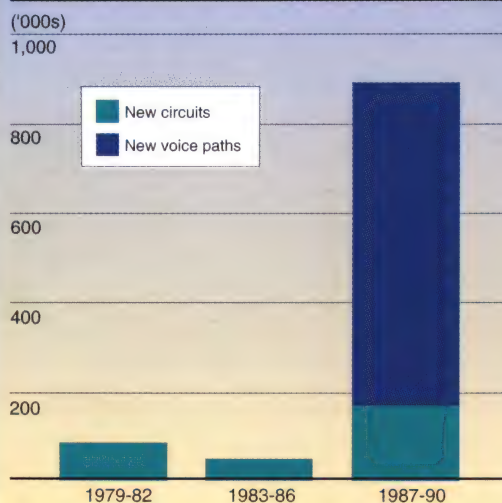
ment with Telefonica and 158 times the settlement with the then OTC.

If this pattern was mirrored in relation to other developed countries the accounting rate system is clearly rewarding the sale of developing country markets to the first world. Increasingly, carriers in competitive markets are not going to want to provide investment funds for the globalisation plans of other carriers. Moreover, they realise that the accounting rate system does not guarantee that the money paid to developing countries will be ploughed back into their telecommunication networks. Thus, even where the question of funding a competitor does not arise, the diversion of telecommunication revenue into other areas of state activity (e.g. roads, tanks or Swiss banks) rather than increasing the value of the global telecommunication system is a concern of some PTOs.

Apart from the regulatory limitations on internationalisation in developed countries, this is one reason why the internationalisation of PTOs has focused on developing countries. The strategy is about access sales

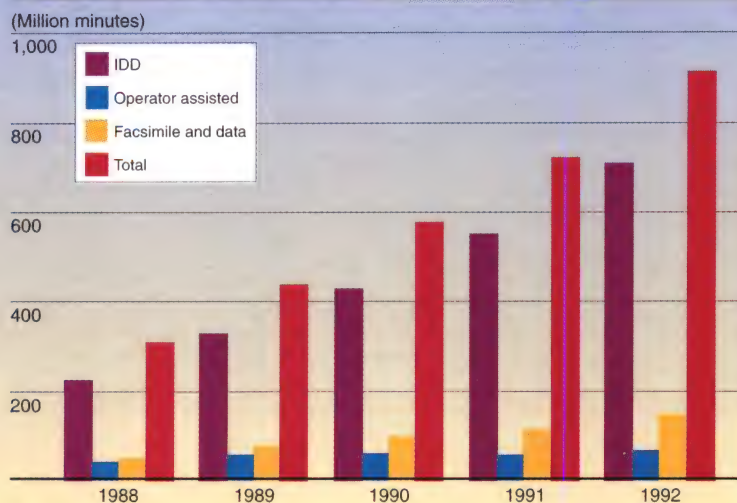


**Figure 5: World Undersea Cable Capacity**



Note: Data based on 37 of 45 new cables between 1987-1990

**Figure 6: Hong Kong Telecom International Traffic**



Source: C&W

to developed countries, particularly where opportunities have arisen in countries with traffic surpluses with developed countries.

This is one of the reasons the privatisation of a PTO in Mexico or the Dominican Republic is so attractive to PTOs from developed countries. By 1992, with accounting rates between Australia and the US standing at \$US0.68, compared to relatively inexpensive leased line facilities and a local access rate of a little over \$0.03, it might be suggested that same attraction exists for Optus. However, Australia is one of the few countries having only a minimal surplus with the US, and on the most recent data available an overall deficit in telecommunication traffic. Nevertheless it is a reminder of the need to reform accounting rates. As a country with an overall traffic deficit, Australia has been a strong advocate of lower accounting rates.

Accounting rates were a product of a cooperative international telecommunication system run by the national monopoly PTOs. In an increasingly competitive environment, interconnection charges rather than accounting rate settlements can be expected to become more prevalent.

In a modern telecommunication system there is little difference between the cost of providing an international or a domestic PTO with access to customers.

This raises the question of what would happen if the international accounting rate system is reformed and/or simply becomes irrelevant as carriers operate at both ends of an international link? In other words, what would happen if instead of paying \$US0.50 (or perhaps \$US2.00) for interconnection to a domestic network (i.e. an accounting rate settlement) PTOs pay \$US0.05 by way of normal access charges? The major change could be that carriers providing end-to-end services, bypassing the accounting rate system, may want to provide end-to-end in-

frastructure. This would also allow PTOs to minimise transit rates, a business for which very little information is publicly available. Moreover it opens opportunities to act as a third party carrier for PTOs that have no common operating agreement. Where a PTO acts as an intermediate switching centre it is paid an agreed intermediary rate by the terminal parties.

In a globalising market this implies a two-pronged strategy. First, a telco needs to ensure it has access to markets through a strategic international network. The second aspect concerns the terms and conditions under which telcos can access customers in foreign domestic markets. In a relatively liberal market owning a share of a carrier means being able to access the national network either at cost (if it is the dominant carrier) or at the prevailing interconnect rate. This raises the question of what is occurring in the international provision of global infrastructure.

## Global Infrastructure

Commentators point to the number of alliances taking place and suggest this is where globalisation is to be found. However, a closer examination suggests this is more evidence of fragmentation than alliance. This is because the provision of international telecommunication has also been a global alliance of the world's PTOs. International telecommunication was once almost wholly provided on a cooperative basis. PTOs with monopolies essentially shared the cost of developing international connectivity between individual national networks. Alliances are a sign of the increasing competition amongst these PTOs.

In the field of international satellite communication divergence from the international cooperative provision of infrastructure is evident in the emergence of separate satellite systems. There are an increasing

number of separate satellite systems offering services in competition to organisations such as Intelsat and Eutelsat made up of the world's PTOs. Many of these separate systems are owned by the Signatories to the international satellite organisations. But satellites are increasingly taking a back seat to fibre optic cables in the provision of international telecommunication. The primary market for satellite systems, with the exception of Inmarsat, is in non-telephony based services.

The first experimental undersea fibre optic cable was laid in 1980, but coaxial undersea cable remained the preferred medium of choice until the mid-1980s (see Figure 3 on page 100). However the analogue cables being laid in the mid-1980s were planned at the beginning of the decade. This explains the hiatus in the amount of cable laid from 1985 to 1987 as PTOs appraised the viability of fibre and proceeded to plan new systems. From that time on fibre has been the preferred medium, although the SEA ME WEA cable, superseded as it was being laid, makes the changeover appear slightly less dramatic.

One reason for the shift to fibre is the reduction in the cost of providing undersea cable capacity. Table 3 on page 98 shows the cost and capacity of a series of trans-Atlantic cables.

Cost reductions through the use of fibre optics had led to what appears to be a scramble between the world's major PTOs to install as much international capacity as possible. In 1991, over 92% of the undersea cable laid by distance was between OECD countries. One of the attractions of fibre optic cable is the dramatic expansion of capacity. Even in 1984 the first 'commercial' cable introduced over an eight kilometre distance by BT represented the equivalent of 25% of the new capacity introduced in that year (see Figure 4 on page 100).



Since 1988 the world's PTOs have dramatically increased investment in undersea cables (see Tables 4, 5, 6 & 7 on page 102). However, yearly breakdowns of investment and cable laid can be lumpy. Probably a more accurate summary of the increased emphasis on providing international infrastructure is shown in Table 5. Investment during the four years from 1988 to 1991 was greater than the previous eight years.

Digital circuit multiplication equipment technology (DCME) can increase the number of telephone voice paths carried by a factor of up to five. This means even the increase in new capacity recorded in Table 5 tends to understate the overall expansion in capabilities. Figure 5 gives an indication of the potential increase in available global capacity since the application of DCME. This technology can also be applied to satellite circuits contributing to a large increase in global capacity. Despite the strong underlying growth in world telecommunication traffic it appears as though capacity will outstrip demand for the foreseeable future.

## C&W Cable Strategies and Traffic

C&W's global network has witnessed rapid traffic growth. Outgoing international traffic carried by the group rose 29% in 1991 from 1,285 million minutes to approximately 1660 million minutes. This was more than twice the global average growth of international outgoing traffic for all PTOs. Growth in HKT's international traffic has been remarkable (Figure 6). Growth in leased circuits has also been dynamic, with the 1,635 privately leased international circuits in 1992 representing a 51% compound growth rate over the previous five years. In the UK, Mercury's leased circuit revenue (domestic and international) increased by over 50% in the year ending 1991 and a further 12% in 1992.

The platform for this growth is C&W's Global Digital Highway. This network was completed when the North Pacific Cable entered commercial service in May 1991. This network links C&W's regional operations on a worldwide basis. The C&W Group has been steadily increasing the number of undersea cables in which it has an investment share. Table 6 shows the number of new undersea cables invested in by members of the C&W Group. A yearly breakdown of these figures shows the greatest growth has occurred since 1989. In most cases this investment has been made in league with other PTOs, something that has long typified international network provision. Yet in some cases this has involved only one partner, such as the trans-Atlantic PTAT cable, in which C&W and US Sprint each hold around half shares.

C&W subsidiaries such as HKT (International) have also been an active investor in undersea cable with a total investment of

\$HK1,700 million at March 1992. Between 1992 and 1995 HKT expected to invest a further \$HK1,940 million. C&W has a 15% share in the North Pacific Cable and a further interest through IDC's 35% holding. Mercury Communications, with a politically stable base, has been one of C&W's major investors in undersea cable (Table 7).

## Australian Implications

Cooperation in the provision of undersea cable is still the market structure most favoured by PTOs. This allows cost to be shared and in most cases the amount of traffic any one PTO would have to a particular destination would not warrant a dedicated cable. However, alliances are being formed between newly emerging carriers, and competitive provision is no longer exceptional among major PTOs. For instance, between 1985 and 1989, five of the seven cables involving AT&T, C&W and KDD were provided with the participation of one or more of those three carriers. In 1990 there were 10 new cables laid with the participation of AT&T, C&W and KDD, of which only two cables had joint investment by these companies. But as long as the accounting rate system provides incentives for the cooperative provision of services, cooperation can be expected to dominate network expansion.

In the long term, reform of accounting rates and the emergence of multiple service providers in a greater number of markets may force a new international settlement system more akin to national interconnection regimes. As such, many PTOs are investing in undersea cables outside their region for the first time. This does not have to be on a standalone basis and cooperative provision still allows greater expansion than could be justified by dedicated networks. The response of other PTOs seems to be to put in as much capacity as possible, particularly given the falling unit cost, perhaps to dampen the enthusiasm for competition in these rapidly expanding networks. Hence the medium, if not the message, may be the munition PTOs increasingly use against the any risk posed by increased competition.

The danger for the world's major PTOs is that a strategy seemingly designed to protect what some claim is an international cartel may backfire. While global cartels often seem invulnerable, they can crumble rapidly if one or more members see it to be in their interest (e.g. OPEC). Some believe international resale may be the harbinger of such developments. Yukio Ito of the KDD Research Institute recently suggested:

"... international simple resale has until now been prohibited, delivering as it does a severe blow to income generated by international telephone services, the carrier's operating base. Viewed from another perspective, the prohibition of international simple resale is one reason why internation-

al leased line services can be provided at such low rates."

He further avers that lifting the ban of international simple resale given the excess capacity, "involved a serious hidden risk — the breakdown of the existing order in the international telecommunications industry, leading to all-out war between the carriers of the industrialised nations."

While it is questionable whether leased lines are provided at lower rates due to restrictions on resale, or are inexpensive at all relative to cost, the statements reflect an underlying current of concern amongst some PTOs. Instead of 'all-out war' the phrase 'greater international competition' may be substituted amongst a group that has in past operated on a wholly cooperative basis. Ito suggests:

"... the FCC is tacitly trying to force the world to choose one of two alternatives ... either accept participation by US carriers in the resale market or accept a reduction of the international accounting rate. This close joint manoeuvre by the government and telecommunications carriers of the US is forcing other countries to re-examine their policies in areas such as the international accounting rate system, the regulation of network operators and the issue of telecommunications sovereignty, particularly with respect to the regulation of participation. Indeed, it is forcing an overall review of telecommunications policy and business strategies."

In Australia, policy makers have embraced a liberal resale regime in advance of most other countries. Where reciprocity exists between Australia and another country this should create healthy downward pressure on accounting rates, although these tend to be countries in the lower bracket of rates. But in terms of Telstra's ability to access foreign markets there may be less incentive for other nations to respond in kind. Nevertheless, increasing resale should force greater numbers of carriers to establish service provision at both ends of international networks.

If 'carrier wars' — or healthy competition, depending on your perspective — do break out, Telstra would seem more vulnerable than its competitors. This suggests Telstra's globalisation strategy needs to carefully assess the advantages of pursuing acquisition or access to foreign markets. Under past monopoly conditions and the accounting rate system, acquisition (C&W's strategy for non-OECD countries) as opposed to participatory access (C&W's developed country strategy) seemed to be the best course. In a competitive market the pendulum seems to be shifting to market access as the priority.

*Dr Sam Paltridge, Centre for International Research on Communication and Information Technologies (Melbourne, VIC).*



## Data/Voice Network Server

Datacraft has released the Marathon 10K high-end data/voice network server from US-based company Micom. The server is able to integrate and switch fax, voice, data and local area network traffic over a single low-cost leased line, according to officials from Datacraft.

The Marathon 10K is capable of connecting up to 12 WAN links, and can send communications over leased lines at speeds of up to 128Kbps. Datacraft officials said the Marathon 10K is the only product of its kind on the market that is able to dynamically allocate bandwidth between voice, data, fax and LAN traffic, and that can also provide telephone voice quality comparative to the PSTN.

It features a mix of cell relay/fast packet multiplexing, bandwidth-saving speech/data compression, and a fax demodulation technology which allows more communications signals to be transmitted over low-cost leased lines.

It has the ability to support up to six WAN links, 12 synchronous user channels, 41 asynchronous user channels, eight voice/fax channels and two 64-user remote terminal server Ethernet connections as well as multi-port Ethernet bridges.

**Datacraft (03) 727 9111**

## Token Ring FOT

INC Manufacturing has announced the availability of its Token Ring 5387 Fibre Optic Transceiver (FOT). According to the company, the product increases the maximum distance from the workstation to the Multistation Access Unit (MAU) using fibre optic cable. The FOT has the



INC's 5387 FOT converts Token Ring signals from copper to fibre

ability to convert a Token Ring signal from copper cable to fibre optic cable and back again, said officials, adding that the unit is of particular benefit in situations such as warehouses or factories, where interference is a problem.

To extend lobe distance, two FOT units are plugged from the workstation to the MAU. The first unit encodes the signal as an optical pulse, while the second restores it to the original electrical form. The FOT unit can reconstruct and reshape the data signal, compensating for any interference caused by cables and MAU's in the signal path, said the officials.

The INC 5387 FOT unit is compact and is easily plugged directly into the workstation via a DB-9 connector, with automatic configuration on either the PC or MAU as a lobe extender, or at Ring In or Ring Out on the main ring path.

It is fully compliant with the 802.5 Token Ring standard.

**INC Manufacturing  
(02) 525 8411**

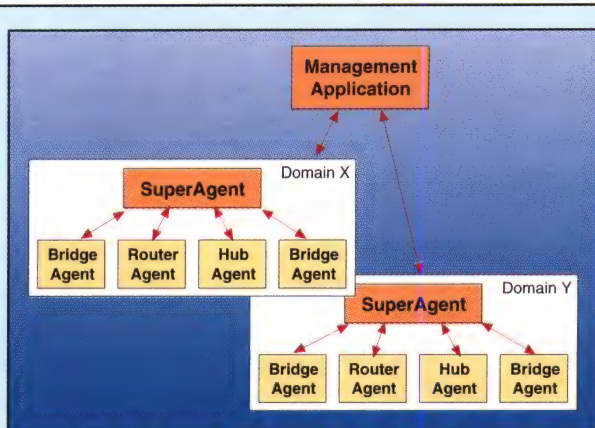
## New 3Com Ethernet Switching Module

3Com has introduced a new high speed Ethernet Switching Module for its LinkBuilder 3GH internetworking hub. 3Com officials said the unit is designed to provide increased internetworking functionality in large, high density networks and bandwidth-intensive distributed computing environments.

It offers improved throughput, two enhanced modes of operation — bridging or switching mode — and additional network media support.

Increased throughput is obtained by using a RISC-based processor which enables the switching and bridging of data at speeds of 50,000 packets per second. Switching mode operation is designed for use in workgroups or private LANs, and supports up to 1,000 addresses. Bridging Mode supports up to 8,000 addresses, enabling it to accommodate much larger networks.

Both modes include features such as Spanning Tree, Broadcast Packet Firewall, and user-definable packet filters.



## SynOptics Opens Up Net Management

Leading networking vendor, SynOptics Communications, has taken another step toward network management Nirvana with new agent technology designed to deliver a new level of network behaviour information to management applications.

Dubbed SuperAgents, the new software delivers network intelligence to SynOptics' Optivity and other network management systems. Assigned to domains throughout an enterprise network, SuperAgent applications act as middle managers for information that feeds to management applications. SNMP based, they perform specific functions such as correlating faults, collecting inventory information and mapping topology. Company officials say that they can decrease network management traffic by up to 100:1.

SuperAgent architecture consists of two main components: SuperAgent software products, which perform the actual data gathering and analysis, and the SuperAgent infrastructure, which has three components: an SNMP request broker, a SuperAgent directory and a domain database. Upon receiving a request for information from a higher level application, the SNMP request broker consults the SuperAgent directory to learn which SuperAgent is responsible for that request. The request is then forwarded to the appropriate SuperAgent, which in turn consults its domain database of network devices, extracts the required information and forwards it to the management station.

Company officials say that each SuperAgent employs an open MIB that third party developers can access. They can be distributed to any Unix workstation or SynOptics' Network Control Engine. SuperAgent technology will make its first appearance with the upcoming release of Optivity 3.0.1, but the company has also made the technology available to third party developers, including Netlabs.

As a first step towards its new global enterprise management (GEM) strategy, SynOptics will resell Netlabs' Asset Manager and Vision Desktop applications. Asset Manager can automatically gather information about all the objects in a networked computing environment, while Vision Desktop can generate real-time status reports from devices residing on the network. Asset Manager will be priced at \$9,286 per user be available by the end of this year for SunNet Manager, and early next year for NetView/6000 platforms. Vision Desktop will be priced at under \$7,420 per user and will be available on IBM NetView/6000, HP OpenView for Unix and SunNet Manager platforms.

GEM is SynOptics' umbrella term for its new strategy of providing third party vendors with access to its network management tools. As well as Netlabs, vendors reportedly working with SynOptics in developing GEM applications include Hewlett-Packard, IBM, Intel, Novell and SunConnect.

**SynOptics Communications (03) 853 0799**



## Cisco Revamps Routers

Cisco Systems has expanded and enhanced its line of remote access routers and simplified procedures for installing routers at remote locations.

Heading the list of product enhancements is the new Cisco 2000 two-port router which is designed for remote corporate locations. Available with either an Ethernet and serial connection, or with a Token Ring and serial connection, the Cisco 2000 supports most LAN protocols, including TCP/IP, IPX and AppleTalk; and many WAN protocols including HDLC, PPP, X.25 and frame relay. IP routing protocols include RIP, OSPF and IGRP. Additionally, the device supports source route bridging, proxy explorer, local acknowledgment, SNA local LU address prioritisation, administrative filtering and NetBIOS name caching. It also supports SNMP and LAN Network Manager.

Company officials say the Cisco 2000 can also be easily upgraded to a Cisco 3000 model router.

The 3000 router series has also received an upgrade with two new models now available: one with an Ethernet port, two serial ports and an ISDN BRA interface; the other with a Token Ring port, two serial ports and ISDN BRA. Based on a 20MHz MC68030 processor, company officials say the Cisco 3000 series offers IP forwarding performance of 5,500 packets per second. Its Token Ring interface uses Cisco's implementation of IBM source-route bridging for non-routable protocols (SNA, NetBIOS), with SRB packets encapsulated in IP packets.

The Cisco 500-CS has also received a face-lift with the addition of true dial-on-demand and bandwidth-on-demand routing. The company has also added support for IPX. The 4000 router platform has also been boosted with the addition of a dual-port Ethernet network processor.

Now available for all 2000, 3000 and 4000 series routers, Cisco's new Auto Install feature simplifies installation procedures for routers at remote locations, company officials say. With the new feature, a leased line-connected remote router can automatically learn its network address and download a software configuration previously prepared at a central site.

**Cisco Systems (02) 957 4944**

The unit's three media options make it adaptable to a wide range of wiring structures. Interface options available on the unit are: 8-port twisted pair 10-Base-T; 8-port fibre optic 10-Base-F; and 4-port AUI for thick Ethernet.

**3Com (02) 959 3020**

## LAN Adaptor Sets

Hewlett-Packard has released what it claims is the lowest priced 10Base-T LAN adaptor in the world.

The new HP PC LAN adaptor NC/16 TP is priced at \$209 (ex tax), and comes with a lifetime limited warranty.

The adaptor provides high throughput and low CPU utilisation, boosting the performance of Microsoft Windows, client/server and other multi-network-

ing applications, said company officials. It supports all the major network operating systems including NetWare, Windows NT, LAN Manager, LANtastic, Banyan's VINES, IBM's LAN Server and SCO Unix.

Officials said the unit is based on highly integrated pipelined bus-master architecture and advanced surface mount technology. It utilises ISA bus-master direct memory access mode to enable direct data transfers between memory and the network without CPU intervention, making it suited to graphics and multitasking applications that can tax CPU resources.

The HP NC/16 PC LAN adaptor is fully software configurable, is compliant with Ethernet IEEE 802.3 standards, and provides built-in NE2100 compatibility, officials said.

**Hewlett-Packard 13 13 47**

## Low Cost FDDI UTP

SynOptics Communications has released two new standards-based FDDI unshielded twisted pair hub products which company officials say are designed to provide customers with FDDI networks with greater manageability and flexibility while remaining cost-effective.

The Model 3905 FDDI UTP Host Module sells for \$6,964, while the Model 2915 FDDI UTP Workgroup intelligent hub is priced at \$18,562 for 14 ports (12 UTP/2 fibre). Both products support single attachment and dual-homing of critical FDDI stations using Category 5 UTP cabling, and can be managed using SynOptics' Optivity network management system.

**SynOptics (03) 853 0799**

## Tivoli Network Management System

Tivoli Systems has announced a new version of the Tivoli Management Environment — a network management software environment for the administration of large networks of distributed computer systems which are running under Unix.

Release 1.6 has been designed for Sun and HP workstations, and incorporates new technology known as configuration and change services, which automate the process of setting up, maintaining and changing enterprise-wide networks of client and server computers, according to company officials.

Components of the new version 1.6 include:

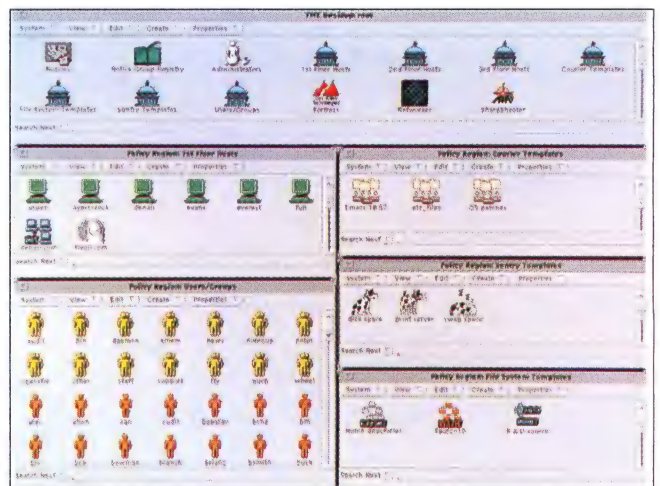
- Tivoli/FSM, which manages Unix client/server file-sharing mechanisms and gives managers a central point of control;
- Tivoli/Works, the most basic configuration management application;
- Tivoli/Courier, which maintains and distributes system software across networks;
- Tivoli/Sentry, which handles remote systems monitoring; and
- The Tivoli/Application Extension Facility, a toolkit that allows system managers to customise Tivoli applications without programming.

Company officials said the software provides systems management tools and a consistent management interface, and added that the Tivoli framework has been adopted as the systems management core of the Open Software Foundation's Distributed Management Environment (DME).

The Tivoli Management Environment Release 1.6 is available now for Sun Microsystems workstations and servers, and will be available for Hewlett-Packard 9000 Series 700 and 800 systems in the third quarter of 1993.

Pricing starts at \$39,000 for a 20-node network which includes the Tivoli Management Framework, Tivoli/Works, Tivoli/FSM, Tivoli/Courier, Tivoli/Sentry and Tivoli AEF. Other packages to suit specific needs are available on request.

**Unixpac (02) 953 8366**



*The Tivoli Management Environment manages enterprise networks*



## Data Compression for High-End Routers

Retix has just released Release 2.0 of its RouterXchange 7000, which features data compression capabilities as well as support for bridging and routing over X.25 networks.

Company officials said that the automatic compression of data over wide area links increases transmission speed and reduces transmission costs.

The RouterXchange 7000 uses a standard non-proprietary implementation of data compression based on the Lempel-Ziv algorithm, and company officials said it provides an average compression ratio of 4:1 across a WAN link, and possibly as great as 8:1 under certain circumstances.

Release 2.0 also provides support for bridging and routing data over X.25 networks for sites that have corporate X.25 networks or access to X.25 public data networks.

All existing RouterXchange 7000 users can upgrade free of charge.

**Retix (03) 563 4333**

## APPC Technology for Windows

Rosser Communications has announced new Rumba software products that provide seamless Advanced Program-to-Program Communications (APPC) capabilities to Windows users connected to IBM mainframe, AS/400, RS/600 and other large enterprise systems.

The new products, from Washington-based Wall Data Incorporated, bring Windows to SAA networks, and enable users to access and run AS/400, mainframe and APPC applications across the same IBM SNA subsystem, according to company officials.

The Rumba APPC engine is implemented as a native Windows application, eliminating the DOS memory limitations that have inhibited the use of APPC by PC users.

Using Rumba for the Mainframe APPC Edition and Rumba for the SAS/400 APPC Edition, users can now run 3270, 5250

and IBM APPC applications simultaneously.

The Rumba APPC engine is also an Advanced Peer-to-Peer Network (APPN) Low Entry Networking (LEN) end node that allows Rumba users on APPN to act as a peer to the mainframe, and AS/400, another PC or a RISC workstation. Rumba's Windows APPC implementation is compatible with the OS/2 APPC Conversation Application Programming Interface.

Officials said Rumba for the AS/400 APPC Edition provides users with an alternative to running the PC support DOS Router at their PC for communication to AS/400s.

The Rumba APPC engine frees up 'low' memory and can provide AS/400 users with a pure Windows environment for accessing, managing and developing mission-critical client/server applications.

An additional APPC package, Rumba Tools for APPC, allows developers to easily learn, prototype and deploy APPC applications in Microsoft Windows environments.

Single user licence fees for Rumba for AS/400 APPC Edition and Rumba for Mainframe APPC Edition are \$990. Existing users of Rumba software can upgrade for \$200.

**Rosser Communications  
(02) 418 2544**

## New Pocket Modem

Banksia Technology recently announced the new MultiModem(u) from MultiTech.

The unit measures 7 by 13.2 by 3.5cm, weighs 220gm, and offers a raw speed of 14,000bps. Banksia officials claim that, coupled with the MultiModem(u)'s V.42 error correction and V.42bis data compression, data throughput can approach 57,600bps.

The new modem can also receive and send faxes at the full 9,600bps rate, with automatic fallback. It can run on batteries or via an AC adaptor, and includes the full range of diagnostic and call progress LEDs, and also LEDs to show fax mode and battery charge.

**Banksia Technology  
(02) 418 6033**

## FDDI Test Sets

Hewlett-Packard has introduced the handheld HP J2215A/6A/7A FDDI test sets, which provide fast and simple verification of port functionality and PCM(1) protocols, and qualify the cable plant for FDDI(2) networks, according to an HP spokesperson. The HP J2215A is a multimode FDDI test set, the HP J2216A is a single mode FDDI test set, and the HP J2217A is an STP FDDI test set.

Company officials said the test sets can provide both private-network managers and network-service organisations with simple ways to test complex FDDI station management and physical connection protocols.

A functional FDDI device implements the PCM (physical connection management) protocol specified by ANSI X3T9.5. Each test set then automatically runs the connection sequence to determine the port type, check the connection with the station's connection policies, and execute the link confidence test.

The company also said the new sets provide comprehensive diagnostic information to assist users troubleshoot non-functioning ports.

The sets are able to quickly qualify an FDDI cable by determining if a fibre optic segment is capable of supporting FDDI transmissions as defined in the ANSI X3T9.5 spec, and reports the link error rate in an easy-to-read format, said officials.

The HP J2215A/6A/7A test sets provide up to eight hours of

continuous portable use from one overnight charge. Each unit weighs around 680gm, has a two-line-by-19-character LCD which displays measurement parameters and results, and comes with a three-year limited warranty and unlimited on-line application support.

The new HP J2215A sells for \$9,600; the HP J2216A model for 13,300; and the HP J2217A for \$8,450.

**Hewlett-Packard 13 13 47**

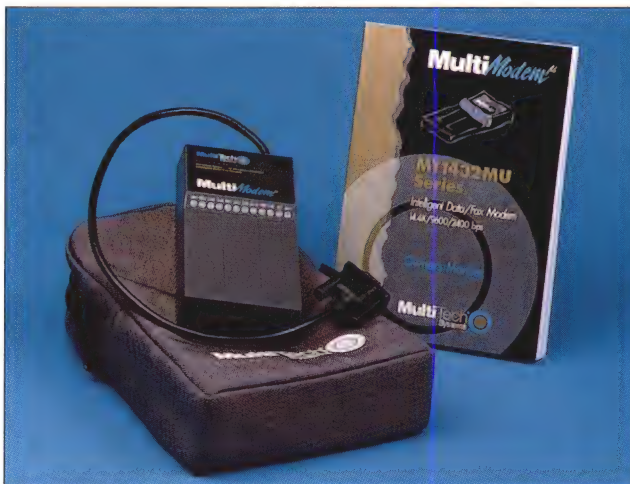
## Retix X.400 for NetWare

Retix has announced that it will be releasing Retix X.400 for NetWare Global MHS. The product is the first natively integrated X.400 NetWare Loadable Module (NLM) for the NetWare Global MHS environment, and extends connectivity to include a wide range of X.400-based public mail services, private X.400 services connected by public carriers, and other OSI messaging systems.

Users now have the ability to exchange messages, documents and files with users at X.400 destinations, according to a Retix spokesperson.

Retix X.400 for NetWare Global MHS includes NLM versions of the Retix X.400 MTA/RTS, the Retix Configuration Utility (RCU) developed for the product, as well as the Novell X.400 Protocol Access Module and OSI LAN/WAN transports, and a utility for configuration of OSI transports.

**Retix (03) 563 4333**



*The MultiModem(u) has a raw speed of 14,000bps*





The OmniBook 300 is light, compact, and features two storage options

## Micro Channel Brouter

NCR has introduced a new high-performance brouter on a Micro Channel card, which the company says will provide small workgroups with a cost effective and simple method of implementing most LAN-to-WAN connectivity.

The NCR StarWAN Model 110 is a board-level product that can expand a network without the need for a more expensive brouter box. As a brouter, the StarWAN Model 110 is configured to route some communications protocols, while bridging others. The board is designed to be inserted into either an existing NCR System 3000 server, or into any two adjacent Micro Channel slots of a client workstation, or other system, on the network, and allows Ethernet or Token Ring LANs access to larger WAN environments.

The product was jointly developed by NCR and Cisco Systems, said a company official. The brouter performs all routing and bridging functions via an on-board Motorola 68030 processor and uses the Micro Channel bus only as a power source.

Models equipped for Ethernet can support a number of protocols including: TCP/IP, DECnet, XNS, Novell IPX, Banyan Vines, AppleTalk (Ethernalk), OSI and bridging StarGROUP 3000 LAN Manager.

Concurrent bridging via the IEEE 802.1D Spanning Tree Protocol for non-routable protocols such as DEC LAT and MOP

is supported through the card's bridge functions.

In a Token Ring environment, the StarWAN 110 supports routing NetBIOS and other source-routing applications. The StarWAN will also route TCP/IP, OSI, Banyan VINES, XNS, Novell IPX and AppleTalk between Token Ring end stations, or between Token Ring and Ethernet end stations. Ethernet or synchronous serial links may be included between end stations in an arbitrary topology. An SNMP protocol is also supported, said the company spokesperson.

**NCR (02) 964 8111**

## New HP Portable

Hewlett-Packard has teamed up with Microsoft to produce the HP OmniBook 300 personal computer, which the companies claim is the smallest and lightest PC on the market to feature a full-size keyboard and full VGA screen.

The OmniBook 300 measures 28.5 by 16.4 by 3.6cm and weighs approximately 1.32kg. It features an enhanced reflective display, PCMCIA hard disk drive or flash-disk-based mass storage that can run on four AA batteries.

Other features include: 'instant-on' applications that offer hot-key access to a suite of Microsoft Windows applications including Microsoft Word and Excel, as well as hot-key access to HP's suite of built-in personal management applica-

tions; a built-in pop-up mouse that provides performance to match a normal desktop mouse; long battery life providing continuous use of up to nine hours in systems using flash disks and up to five hours in systems with hard disks.

The machine, the product of an alliance between HP and Microsoft, is the first PC to feature ROM-based versions of Excel and Word, and ROM-based Microsoft Mail is included with the optional fax/modem. The ROM-based versions mean there are no boot delays or prolonged application switching, said HP officials.

The unit comes with two storage options — a 40Mb PCMCIA 2.0 type III hard disk, or, alternatively, a 10Mb flash disk on a PCMCIA 2.0 type II card. Both options take advantage of the system's built-in DoubleSpace compression program to double the storage capacity to 80Mb and 20Mb respectively.

The system's communications capabilities include LapLink Remote Access software as well as a user-installable 2,400-baud data, 9,600-baud send/receive fax modem.

Pricing for the OmniBook 3000 starts at \$3,500 (ex tax) for a unit with a 40Mb hard disk.

**Hewlett-Packard 13 13 47**

## New Remote Compression Bridge

ADE Network Technology has released its new LANB/220M Remote Compression Bridge. The company says the product provides a low-cost solution for interconnecting remote local area networks based on Ethernet and IEEE 802.3 standards. It connects remote LAN segments over telephone links to form a single transparent network.

Officials from the company said the LANB/220M offers increased throughput using state-of-the-art data compression algorithms, which can compress data by searching for repetitive strings. The officials said a ratio of 4:1 can be achieved depending on the type of data.

The bridge comes in a standalone enclosure with its own power supply. Each bridge provides one LAN connection and

one WAN link interface. Link interfaces available include RS-232, RS449/422, V.35 or X.21, and the Ethernet connection may be AUI, Thin Ethernet or 10Base-T. The LANB/220M is also available in a multi-unit enclosure.

Officials said any synchronous link may be used for the remote connection between the bridges, including analogue or digital wide area network services, data switches and variable speed links up to 256Kbps.

The new Remote Compression Bridge operates at the data link layer, filtering and forwarding traffic according to Ethernet addresses, and is transparent to all higher level protocols such as TCP/IP, DECnet, XNS and ISO. **ADE Network Technology (03) 543 2677**

## Dual Interface Ethernet Adaptor

Kingston Technology has released a dual interface pocket Ethernet adaptor which can connect to any notebook, laptop or desktop PC via a parallel printer port, according to officials from the company.

The adaptor is able to support both 10Base-T and 10Base-2 networks, making it especially useful for mobile professionals who need to interface with different networks at different locations, said officials. It is compatible with most popular network operating systems, including Novell NetWare, Microsoft Windows for Workgroups and LAN Manager, and other NDIS-compliant systems.

The Pocket Ethernet Adaptor is priced at \$614.

**Australasian Memory (02) 899 5637**



The Pocket Ethernet Adaptor can support 10Base-T and 10Base-2



## Packet Switching For SmartModems

NetComm has announced new X.32 upgrade software for its new range of SmartModems and Pocket Rocket E7F, enabling them to connect to all packet switched networks.

According to a NetComm spokesperson, the software allows SmartModems dial-up access to packet switched networks like Austpac or Pacnet, providing error correction and conformance to CCITT recommendations to ensure full compatibility with other X.25 packet switched networks.

The NetComm X.32 Software Upgrade uses special 'profiles' of packet switched networks to simplify connection and data transmission, said the spokesperson. To set up a modem for packet switched networks, the X.32 software transfers the X.32 profiles to the modem. Connection profiles are included for the most popular

packet switched networks in Australia and New Zealand.

The software also incorporates an automation function to allow connections to be made quickly, and issue the relevant identification codes to initiate access.

The NetComm X.32 Software sells for \$99, and users need the latest SmartModem V.32bis M7F, M4F or E7, or the new Pocket Rocket E7F.

**NetComm (02) 888 5533**

## Network Modelling

Phoneware, the Australian developer of telecommunications management systems, has released a new PC-based telecommunications network planning and modelling system that allows users to plan, model and test proposed networks before they are installed.

The product, called MicroNAP II, comprises six modules integrated into a system that runs on 386SX PCs or better.

It provides network sampling and 'what if' scenarios across a wide range of telecommunications functions. Modules include Traffic Analysis, Costing, Quality/Optimisation, Traffic Import and International and national tariffs, according to officials from the company.

The Traffic Analysis module is the foundation module of the system, allowing users to input traffic from each site to every destination, differentiating between extension and exchange line traffic where appropriate. The module will map the traffic onto private links — utilising bandwidth on the most direct links — before looking at alternative routes. When all private network link circuits have been saturated, the overflow will be costed at PSTN rates, showing where additional savings can be made if new circuit capacities were made available, said the official. Other modules can be added to the Traffic Analysis module, as required.

**Phoneware (03) 894 3150**

## Personal Video System

NetComm has begun to ship the upgraded Cameo Personal Video System from CLI. The system provides users with low-cost videoconferencing to their desktop, and the new version, Cameo 2.0, also offers collaborative computing abilities, said the officials.

The product runs on Macintosh computers in colour at a speed of 15 frames per second, at a cost of \$5,795. Existing customers will be upgraded free of charge.

Version 2.0 has a number of new features, including: the ability to send and receive any Macintosh file at speeds of 56Kbps; the ability to take a still frame image of any portion of the Macintosh screen and transmit and display the image on the remote site Macintosh; the ability to work with other video applications, such as RasterOps Media Grabber, to capture and record the video images to disk;



## DATA COMMUNICATION TEST EQUIPMENT

### INTERFACE CONVERTERS

RS-232

RS-422

RS-423

RS-485

RS-499

RS-530

MIL-188

IEEE 488

V.35

**FIBRE OPTIC, CURRENT LOOP, COAX**

**MODEMS LINE DRIVERS**

## ETHERNET PRODUCTS

**INSTALLATION, SERVICE**

**"ONE STOP SOLUTION"**



**JZW COMPUTERS & COMMUNICATION**

**PO BOX 322, DEE WHY, NSW 2099**

**PHONE (02)975 4011**

**FAX (02)975 4223**



one-step snapshot and send of images; and support for multiple cards, such as SuperMac Video Spigot, Fast Electronics Screen Machine Card and RasterOps 24STV, 24XLTV and Media-Time cards.

The Cameo Personal Video System is certified for use in 18 countries, according to a NetComm spokesperson.

**NetComm (02) 888 5533**

## Rack Mount Enclosure

MM Cables Communication Products has launched a new 19-inch rack mounted enclosure, called the OFCTE/1500, which provides a convenient and secure method of terminating optical fibre cables, according to a company spokesperson.

The enclosure features a swing-out design to allow easy access to fibres during installation and storage of excess fibre at correct bend radii.

Officials said the cabinet has been designed to accommodate

either direct connectorisation or fusion splicing, and it has anchor points for up to four incoming cables, providing positive strain relief, and it enables splicing for up to 36 singlemode or multimode fibres, plus eight additional multimode for FDDI use.

The patch panel has provision for mounting up to 36 'ST' 2.5mm bayonet and up to 4 FDDI through adaptors.

The OFCTE/1500 is made of a powder coated steel construction, and is suitable for use in 19-inch racks with a minimum depth of 450mm.

**MM Cables (02) 600 0777**

## HP Pocket E-Mail

Hewlett-Packard, in conjunction with Lotus Development, has introduced its new HP 100-LX palmtop personal computer, and industry-standard handheld computer that runs off-the-shelf PC software.

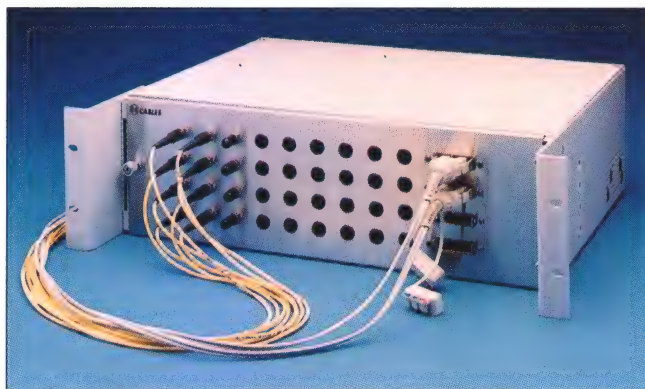
The 311gm palmtop comes complete with built-in Lotus

cc:Mail, and HP officials say it is designed as a companion PC for mobile workers. The unit also has enhanced built-in PIM (personal information management) software, MS-DOS 5.0 and Lotus 1-2-3 included, and HP officials said the new model is 50% faster than the previous model, the HP 95LX.

The system offers an 80 x 25-character display with a new zoom feature that allows users to view text-based applications in three different sizes — 80 char-

acters by 25 lines; 64 characters by 18 lines; or 40 characters by 16 lines. HP officials said the display provides the highest resolution for its size of any on the market.

The unit can connect to all major e-mail networks, and supports both wired and wireless communications. Users can select between paging, e-mail, file transfer, printer and modem connectivity, and the HP 100LX includes an upgraded 9-pin serial port for connecting to print-



The OFCTE/1500 rack mount enclosure has a swing-out design



**MICROTEST**  
CABLE CERTIFICATION  
& TESTING SCANNERS



You can CERTIFY, troubleshoot, and manage your unshielded twisted pair (UTP) and coax networks.

With the following features, you will be able to solve all your LAN cabling problems:

Wire Map, Length (TDR), Cable Trace (with optional CABLE TRACER II), Near End Crosstalk (NEXT), Attenuation, Noise, Network Traffic Monitor (Ethernet).

For cable certification, the network and cable type is selected, then press "AUTOTEST". The results will be stored for review or may be sent to a P.C. or printer at any time. These scanners save you time, money, and effort by quickly pinpointing cabling problems.



P.O. BOX 57, Lambton, N.S.W. 2299  
**Phone: 049 675266**  
**Fax: 049 602331**

Does your network Incorporate:

## Timeplex Link 2/1

All Layer Systems have been supplying Australian organisations with Second User Timeplex products for nearly two years.

We have over £250,000 worth of equipment in stock available for immediate delivery, including (but not limited to) the following:

QAM, QSC, QSC.2, QSC.4, ILC.2, NCL, DRE/C.2, QVM.3, ILP.5, Nests, PSU's etc.

All the equipment we supply is fully tested and comes with a 90 day warranty, shipping usually takes 7 days. We can offer you huge savings on the modules you need - **when you need them**, for example:

QSC - £475.00 QSC.4 - £825.00 QAM - £595.00  
BPM - £425.00 Link /2 18-Slot nest inc. psu £1685.00

Fax us your contact details and we will send you our full pricing by return fax. We will also be happy to quote for the purchase of any redundant equipment you may have.

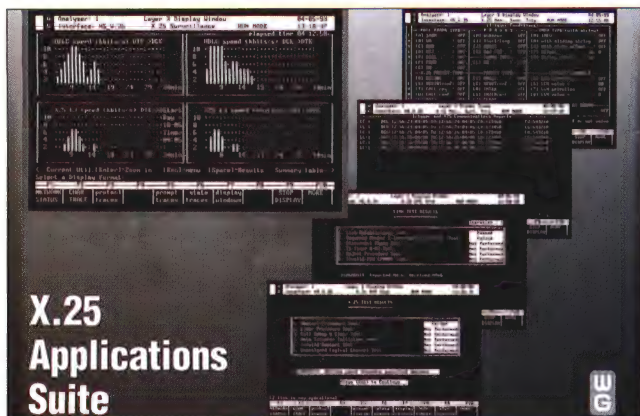
**Fax: +44 494 792428**  
**Tel: +44 494 792757**



**We also supply Dowty/Case DCX / KMX, Vitalink TransLAN & Wellfleet 2nd User products.**

All Layer Systems, Saxeway Business Centre, Chartridge, Chesham, Bucks HP5 2SH UK.





The W&G test applications suite optimises X.25 network performance

ers and modems, and infrared capability for easy file transfer between HP 100LX palmtop PCs up to 115K baud, according to officials.

It comes with a full complement of data communications software installed, including cc-Mail, VT-100 terminal emulation, Kermit and X, Y, Z modem support, facilitating user access to a variety of private electronic mail networks.

**Hewlett-Packard 13 13 47**

## X.25 Test Applications Suite

Wandel & Goltermann has released a new application for its DA-30 Internetwork Analyser for X.25 packet switched data networks. The new application suite combines DA-30 monitoring, surveillance, filtering, triggering and compliance features for X.25 networks, at speeds of up to 2Mbps.

The application suite is comprised of two X.25 applications. The first allows DA-30 users to track statistics in real time and over time (up to seven days) and display the results in tabular and graphical formats — or export them to a PC for further analysis.

The statistics allow users to determine the X.25 network's baseline performance and utilisation for the entire network, or a single user, and isolate problems to a particular node or protocol (X.25 or HDLC), said W&G officials. Users can also filter traffic or trigger analyser actions based on received frames.

The second application consists of modules, one for testing the DTE at Layer 2, and another for testing at Layer 3.

These tests verify the link initialisation and termination procedures of a DTE with the DA-30 acting as a DCE. While performing a series of procedures, the Wandel & Goltermann DA-30 indicates if a new or recently upgraded DTE will communicate with the PSDN.

Both applications run on V.24, V.36, V.35 and X.21 links, and officials said other applications will be added to the suite in the future.

The X.25 Application Suite runs on either a dual or single analyser DA-30 or a DA-31 analyser equipped with a WAN Feature Module (standard or high speed) and a WAN interface module.

**Wandel & Goltermann**  
(03) 690 6700

## Cabletron Support For NetView/6000

Cabletron has announced a network management application that allows the company's connectivity products to be fully managed under IBM's AIX NetView/6000.

Officials said the new application will provide customers with a powerful tool for full management of Cabletron products including bridges, desktop network interface cards, and the



## High density transient protection for telephone MDF

Lightning impulses can have currents exceeding 150,000 Amperes. It is this energy, together with the sharp voltage wavefront of the impulse, which gives rise to equipment damage and possible injury or loss of life.

This potential problem can be eliminated with inexpensive add-on components.

### Critec Subscriber Line Protection

As the modern PABX is highly sensitive to transient voltage disturbances the traditional gas-filled arresters by themselves are no longer sufficient protection for telephone circuits. Critec has designed the SLP, Subscriber Line Protector for the telephone line, and the PLF, Powerline Filter for the mains supply. Together these two devices form an integrated protection scheme for any PABX, office system or switching centre.

### Surge Reduction Filters

The SafeLine range of panel mounted Surge Reduction Filters from Critec incorporates high energy clamping with efficient low pass filtering. SafeLine SRFs are available in single or three phase configurations for load currents of 10A and 16A per phase and are installed in series with the circuit, usually at the local distribution board. For more information fax back this page to **002•73 0399**, or send in the coupon below.

**CRITEC**  
The sign of protection

Fax 002•730399 Phone 002•730066  
Critec Pty Ltd, Box 526  
GPO Hobart 7001 Tasmania  
NSW (02) 688 4528 VIC (03) 696 1633  
ACT (06) 257 3055 QLD (07) 849 5077  
SA (08) 364 2555 NT (089) 41 3880  
WA (09) 257 1065 NZ (09) 309 2464

YES. Please send me further information on —  
☐ Critec Subscriber Line Protection, SLP  
☐ SafeLine Surge Reduction Filters, SRF

NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ POSTCODE \_\_\_\_\_  
PHONE \_\_\_\_\_ FAX \_\_\_\_\_

CRC-A274 02





*AOI's products will be distributed in Australia by Kingfisher*

multimedia access centre series of intelligent hubs.

Cabletron has also announced that it has signed an agreement with IBM whereby IBM's Systems and Operational Services organisation will provide network diagnosis and maintenance services around the clock, seven days a week, to Cabletron's complete range of hardware products.

**Cabletron Systems**  
(02) 488 9730

## AOI Distributor

Kingfisher International has recently announced that it has been appointed as the exclusive Aust-

ralian distributor for Advanced Optonics Incorporated (AOI), a US-based manufacturer of fibre optic network components and instrumentation.

AOI's range of products includes active in-line components such as tunable filters, polarisation controllers, phase shifters and modulators, passive couplers and isolators, fibre optic 1 x N switch, laser diode power supply and stabiliser, and fibre optic communications links (to 1 GHz).

**Kingfisher International**  
(03) 764 3933

## Ethernet Print Server

Black Box Catalog has introduced the new ultra-compact Ethernet Print Server MP-1, which the company says can queue network print jobs from hosts running NetWare, TCP/IP, LAT and Apple's EtherTalk at the same time.

A spokesperson claimed the product does not require any ex-

tra host software or firmware when running NetWare, AppleTalk and LAT. For TCP/IP systems supporting Berkely Remote Printing, the Print Server includes the Unix Print Daemon. Native LP or LPR printing is supported via the RTEL software included in the unit.

The Ethernet Print Server MP-1 stores the software executable code in Flash PROM, so there is no need to wait for it to download, said the company spokesperson.

**Black Box Catalog**  
(03) 879 7100

## Intelligent Serial Boards

DigiBoard has introduced its new Xem family of intelligent serial boards that enable a single PC to serve as the host for up to 64 users connected via serial ports, according to the company.

The Xem range is available for ISA, EISA and MCA bus platforms, and each adaptor has



*The MP-1 can work with a range of network operating systems*

its own RISC chip, relieving the host computer of nearly all the I/O overhead, said the company officials.

Each Xem system has a host adaptor card which attaches to a connector module supporting 16 RS-232 asynchronous serial ports. If more than 16 ports are required, up to three extra modules can be daisy chained together, all external to the host.

Up to 64 ports can be supported through one expansion slot, and no external power supply is required.



# The communications revolution holds the key to the future of information technology

**Australian Communications is the magazine dedicated to the coverage of the rapidly growing data and telecommunications industries . . . Subscribe to Australian Communications and save 15% off the newsstand price.**

☐ 22 issues, two years, for \$96 (save 20%)

☐ 11 issues, one year, for \$54 (save 10%)

I enclose my cheque for AUS\$

☐ Bill my company Authorising signature

Charge my: ☐ Amex ☐ Diner's ☐ Visa ☐ Bankcard ☐ Mastercard

No Expires

Name

Company

Address

Postcode

Signature

**Post to:** Australian Communications, Level 4, 541 Kent Street, Sydney NSW 2000

**OR:** Fax your application to us on (02) 264 2244

**SUBSCRIBE NOW**



The new Xem board's 20-MHz IDT RISC processor cuts CPU overhead to 0.2% of host processing capacity per port, said officials, adding that the average per node connectivity cost is around \$100 per port.

**SealCorp Computer Products (02) 319 4611**

## New W&G Selective Level Meters

Wandel & Goltermann has released a new family of Selective Level Meters for in-service testing. The new range includes the SPM-139, the PSM-137/138/139, and the SPM-37/38/39.

The SPM-139 Selective Level Meter (50Hz to 32MHz), a compact in-service tester for the maintenance of FDM systems and for general measurement on telephone lines and data links.

Officials said the instrument also has applications in cable testing (ISDN and LAN), and can function as an HF voltmeter. Features include battery opera-

tion, set up memory, fixed frequencies and CCITT test modes (noise, impulse noise, interruptions, phase jitter). Test results can be viewed on a display, and stored on a memory card for documentation purposes.

Other versions of the instrument are available with different frequency ranges. The PSM-137/138/139 are fully complete level measuring setups with built-in tracking generators. The SPM-37/38/39 use LC displays for low power consumption, so they are suitable for field applications using battery power.

**Wandel & Goltermann  
(03) 690 6700**

## SNMP Over APPC

SynOptics has announced the first fruit of its partnership with Eicon Technology in the form of a new product designed to transport SNMP management information over IBM's APPC.

Company officials claim the new SNMP Transport Gateway



Wandel & Goltermann's PSM-139 has a built-in tracking generator

will provide network managers with a cost effective way to manage SNMP systems in remote networks using their existing SNA WAN. It will enable SNA managers to control and manage remote Token Ring networks without having to install a parallel TCP/IP backbone, they say.

The product consists of hardware and software for OS/2 PCs. Acting as a gateway, the OS/2 system accepts data from SynOptics' intelligent management modules and uses APPC to

traverse the SNA backbone network. As the data reaches its destination, another gateway strips the information out of the APPC packet and sends it to the SNMP management station, which will typically be an RS-6000 Optivity system on a NetView/6000 platform, company officials say.

Priced at around \$4,600, the SNMP Transport Gateway will be available in October.

**SynOptics Communications  
(03) 853 0799**

## The PC-based WAN protocol analyser family from Network General

### LM2000

The all-in-one tool for today's and tomorrow's networks, ASYNC to ISDN to FRAME RELAY from 50bps to 2Mbps.

- RISC processor
- Data monitoring, BERT(G.821), simulation, decodes and statistics
- On-board interfaces V.24, V.35, V.10/V.11, RS449 adapter, E1 and T1 pods
- Real time pre-capture filters
- Frame Relay support for up to 256 DLCIs incl. decodes of embedded WAN/LAN protocols
- Programming languages with built-in library of ready-made test applications

### LM1 Olympic Edition

Put the power of a dedicated 72Kbps analyser into a personal computer.

- Data monitoring, capture, emulation and BERT at 72Kbps on V.24, V.10/V.11, V.35
- Full plain-English decodes for X.25/X.75, SNA, QLLC, Q.931, TRANSD, DDCMP and other
- Precapture filtering with up to 6 simultaneous traps
- Level 2 and 3 real-time statistics
- Library of prewritten test scripts

### LM1 PocketScope

Zero slot-The first PC-based protocol analyser for WAN testing that does not require an expansion slot. Ideal for portable or on-site desktop PCs.

- Notebook portability
- Remote control from any PC
- Plain English decodes for X.25, SNA, QLLC and other protocols
- Level 2 statistics
- G.821 BERT
- Built-in test libraries and macros.

### ISDN tel/scope

LM1 Olympic Edition with on board ISDN interfaces and software tailored for ISDN testing.

- ISDN 2B+D S/T interface
- WAN interfaces V.24, V.35, V.10/V.11
- B- or D-channel protocol support for ISDN BRI and PRI
- Voice and data monitoring in B-channel
- E1 pod for channel access on ISDN/PRI links

### CompaSS7

A combination of high performance WAN analyser with an SS7 network analyser supporting up to 4 64 Kbps-links at 100% utilization.



# TESTCOM-DATA

217 North Rocks Road, North Rocks NSW 2151  
Telephone: (02) 630 7528 Fax: (02) 630 7226





## **TOWARDS 2000** **TUANZ 93**

# **The Telecommunications Event that will prepare you for the year 2000!**

This is the chance for business people to get the information they need in a non-pressure environment.

TUANZ 93 will be the largest telecommunications event ever in New Zealand, featuring the latest technologies from around the world.

Enjoy a variety of presentations, displays, workshops, seminars and social events where you can meet people in this vital industry.

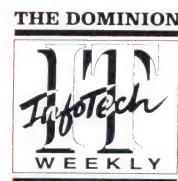
### **You can't afford to miss**

## **TUANZ 93 CONFERENCE AND EXHIBITION**

**Ellerslie Function Centre  
Auckland, New Zealand  
4-7 August 1993**

FOR FURTHER INFORMATION CONTACT  
Telecommunications Users Association of New Zealand Inc.  
PO BOX 331 014, Takapuna, Auckland, New Zealand.  
Telephone +64 9-488 1602 Facsimile +64 9-489 9515

Premier Sponsor



Gold Sponsors



New Zealand's Information Systems Management  
**COMPUTERWORLD**

**Telecom**





## Taiwan: Record Growth and Regulatory Change

In early June, the Pacific Telecommunications Council (PTC) held its Mid-Year Seminar in Taipei, Taiwan. Our seminar featured the somewhat bland, anodyne title 'World Trends in Corporatisation and Privatisation.'

The meeting, however, was anything but bland. Not only are events in the region occurring at an unprecedented rate, but Taiwan itself is undergoing a massive telecoms development project. The scale of development undertaken by the Directorate General of Telecommunications (DGT) is staggering, and many investors and telecoms entities are crowding the Taiwanese market to offer their wares and services.

According to Dr Duei Tsai, the Director of DGT's Corporate Planning Department, the DGT's six-year national development plan consists of ten major projects comprising a total investment of \$US4.3 billion. These projects are:

- A digital local switching system;
- A digital toll switching system;
- An optical fibre subscriber loop;
- The Chung-Shan Freeway optical fibre system (this motorway spans the island from north to south — already completed);
- An integrated special services network;
- The Taiwan-Matsu submarine fibre optic cable system (Matsu is a Taiwanese island off the Fuzhou coast — already completed);
- Joint participation in the construction of the Asia-Pacific submarine cable system;
- A Personal Communication Network (PCN);
- An intelligent network, and
- An Integrated Services Digital Network (ISDN).

After viewing the pace and progress of Taiwan's telecoms development, I have no doubt they will achieve these seemingly overly-ambitious plans. Moreover, that \$US4.3 billion shopping list above is only a part of the total \$US17.4 billion level of telecoms investment earmarked for the 1991-1996 period.

Does this staggering level of investment open the door for competition? At this point things get a wee bit complicated. Mr Jin Der Lee, Deputy Executive Secretary of DGT's Research and Planning Committee, endeavoured to explain the regulatory changes being undertaken in Taiwan.

At present, DGT is a directorate under the Ministry of Transportation and Communications (MOTC). It is the national and international carrier, but is in fact a government department — not even an agency or government corporation. This is changing. DGT will become more akin to communications ministries in other countries, keeping a policy role (as well as being regulator).

DGT will 'corporatise' its carrier role into the Chunghwa Telecommunications Corporation, which will be a government-owned

corporation. DGT's International Telecommunications Authority (ITA), the international carrier, will become the International Telecommunications Corporation (ITC).

These steps are indicative of more than just a change of stationery. The proposed Taiwanese *Telecommunications Act* would redefine telecommunications into 'Category I' and 'Category II' carriers. Openly modelled on Japan's similar legislation, Category I services are basic telephony and 'enterprises which install telecommunication equipment and line plants for the operation and provision of telecommunications services.' Category I services will be the monopoly of the MOTC-owned CTC.

Category II services have a little more flexibility. Category II really means value added services. All Category II services must be submitted by DGT for MOTC approval and 'business scopes' may be reviewed by the Ministry every six months.

To many, these steps may sound rather tentative and hesitant. DGT is, after all, a large government bureaucracy of over 38,000 employees (on an island state of 20 million inhabitants and not a lot of geography). Moreover, Taiwan's history confers a large role to the government in overall development planning. The country is changing very quickly, both technologically and politically. The steps taken by DGT are honest and heart-felt. They do wish to evolve into a corporate carrier along the lines of Singapore Telecom or Telstra. But it would be unrealistic to expect a New Zealand-like solution, say, in a country with such a strong statist tradition.

At least for now, there is not a lot of discussion regarding the possibility of a second carrier, whether for international or domestic services. The emphasis is getting a state-of-the-art network in place, and then permitting the luxury of thinking about diversity.

There is some evidence that business users would welcome the downward pressures on international telecom tariffs that a competitor can provide. After all, look at Korea. Dacom's 5% rate discount to a handful of countries brought it a 30% market share of international traffic within a very short period of time. Korea Telecom has responded in kind and the competition between the two has led to lower international tariffs overall.

Perhaps the conscious modelling of Taiwan's proposed *Telecommunications Act* on the 1987 Japanese telecoms legislation, with its division of Type I and Type II carriers, will lead Taiwan to contemplate the other central component of the Japanese legislation — long distance and international competition. This competition brought about international service competitors to KDD such as ITJ and IDG. It also made KDD more global in scope and more efficient.

Nevertheless, the progress made by Taiwan is undeniable and impressive. It seems quite likely the new telecoms legislation will pass the Executive Yuan and Legislative Yuan (Taiwan's upper and lower houses of parliament) and become law in the not-too-distant future. Once it does, and once the corporatisation of DGT's carrier functions into CTC takes place, it seems likely that the economic and political pressures for increasing competition in the sector will grow. At its current stage and rate of development, it appears entirely unlikely that Taiwan would permit itself to fall behind in any aspect of telecoms development, including the opening of the market to competition.

*James Savage is the Assistant Director, Pacific Telecommunications Council and Editor of the Pacific Telecommunications Review.*

### Telecoms in Taiwan

	FY1992	FY1993	Growth
Telephone Subscribers	7.14m	7.70m	7.28%
Radio Pager Subscribers	1.10m	1.25m	16.18%
Mobile Phone Subscribers	0.30m	0.50m	56.83%
International Phone Calls	0.33m	0.40m	19.94%
Data Subscribers (Leased Line)	0.034m	0.039m	12.92%

NB: All figures are rounded

Source: Directorate General of Telecommunications, Taiwan 1993



# INS leads the way

## TEST INSTRUMENTATION • NETWORK MANAGEMENT SYSTEMS

### TDR/LAN SCANNER



- TDR and cable scanning for UTP, STP, Coax, IBM cabling.
- Measures NEXT, length, ATTENUATION, Resistance, continuity, LAN monitor.
- Optional cable management and cable grading software.

### INTERVIEW 8000 WAN ANALYSERS



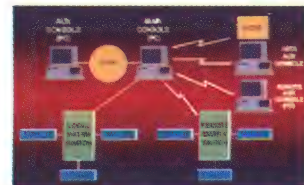
- High performance protocol test system for field and LAB use.
- Supporting C, SS7, Frame Relay, ISDN, X25, SNA, QLLC and user decodes.
- Interfaces for RS232, V.35, X.21, G703, T1.

### PC-BASED BERT



- Turn your PC into high speed BERT.
- Support RS232, V.35, X21, G703, G704.
- G821 analysis with histogram and capture to disk.
- G704 monitor tool.

### MATRIX SWITCH



- Non-blocking
- 12 to 4096 ports.
- Mix protocol speeds and interfaces.
- Netview support.

### LIGHT SOURCE/OTDR/POWER METER



- Fiberoptic test equipment for LAN, WAN, FDDI.
- PC-based and hand-held.
- Power attenuation, dual wave length test systems, LED or Laser sources, Talk sets.

### NETWORK PROBE



- Multi-function analyser.
- Built-in interfaces for RS232, X.21, V.35, ISDN.
- Multiple protocols support.
- Light weight/low cost.
- AC/DC operated.

### LAN/WAN ANALYSER



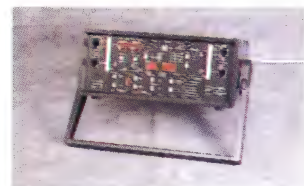
**LAN: Token Ring  
ETHERNET**

**WAN: ISDN  
FASTPAC  
AUSTPAC  
TRANSEND  
DDN  
SNA**

#### PROTOCOLS:

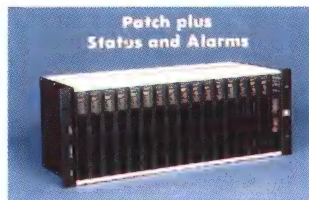
**X.25, SNA, HDLC,  
SDLC, SS7,  
Q921/Q931, XNS,  
TCP/IP, NETBIOS,  
NETBUI, ISO,  
APPLETALK, MBI,  
DECNET, SUNNFS,  
X-WINDOWS, SNMP.**

### SIMULATORS



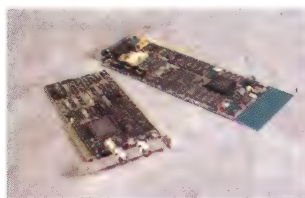
- Most major Telephone network types.
- DDS, ISDN links.
- DDS, ISDN cables.
- Multiple cable gauges, length and speed up to 34.8MBPS.

### DATA PATCH/SWITCH SYSTEMS



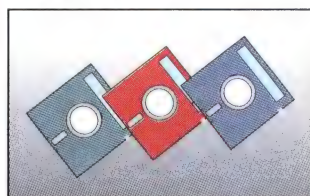
- Circuit switching and PATCHING.
- RS232, V.35, X.21, G703 etc.
- Transparent to protocol.
- Full remote or local control.

### PC-BASED PROTOCOL ANALYSER



- Turn PC into full function protocol analyser.
- Half size card supporting major protocols, interfaces.
- Speed up to 256KBPS.

### SOFTWARE



- LAN management software for Ethernet, Token Ring, ARCNET and Appletalk.
- Comprehensive statistics and protocol decodes.
- Low, low, cost!

Please send me more information on:

- |  |   |  |   |                                 |
|--|---|--|---|---------------------------------|
| <input type="checkbox"/> TDR/LAN SCANNER           | <input type="checkbox"/> INTERVIEW 8000   | <input type="checkbox"/> PC-BASED BERT | <input type="checkbox"/> MATRIX SWITCH              | <input type="checkbox"/> OTHERS |
| <input type="checkbox"/> NETWORK PROBE             | <input type="checkbox"/> LAN/WAN ANALYSER | <input type="checkbox"/> SIMULATOR     | <input type="checkbox"/> DATA PATCH/SWITCH SYSTEM   |                                 |
| <input type="checkbox"/> FIBEROPTIC TEST EQUIPMENT |   | <input type="checkbox"/> SOFTWARE      | <input type="checkbox"/> PC-BASED PROTOCOL ANALYSER |                                 |

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

ORGANISATION: \_\_\_\_\_

PHONE: \_\_\_\_\_



INFORMATION NETWORK SOLUTIONS PTY LTD  
Unit 3a, 3 Lanceley Place Artarmon, NSW, 2064  
PHONE: ( 02 ) 906 - 6335 FAX: ( 02 ) 906 - 6327





From the desk of the Executive Director

## The Jury's Out on Flexi-Plans

**Wally Rothwell**

**T**he issue of whether Telecom's Flexi-Plans and Strategic Partnership Agreements (SPAs) are legal has achieved some prominence lately and has indeed been contested in court by Optus.

No matter what the eventual outcome of the court action, the Department of Transport and Communications has canvassed a number of options to amend the *Telecommunications Act 1991* in order to make clearer the Government's intentions about innovative and flexible tariff offerings.

This initiative follows on from a letter to Austel from Minister Bob Collins in late 1992.

The letter explained the Government's policy position "... that the relevant legislative provisions, while providing a general prohibition against discrimination, are intended to allow

some flexibility to ensure that the stated intention of preventing abuse of market power (Section 173) is not achieved at the expense of service innovation and benefits to consumers generally."

While the Minister did indicate that particular scrutiny should be given to the 'bundling' of different types of calls into Flexi-Plans (e.g. local and mobile bundled with long distance), he suggested that it may be appropriate to make regulations under Section 183 (2) of the *Telecommunications Act*, so that some Flexi-Plan types could be exempted from the discrimination provisions of the Act.

### Maintaining the Balance

ATUG is keen to see that its members and the community at large realise the benefits of competition, while a fair competitive environment is ensured. The balance is sometimes quite delicate and the issue of Flexi-Plans is a case in point.

ATUG's position essentially is to ensure that effective and sustainable competition is not jeopardised, and we therefore feel that changes to legislation should only be undertaken in the special and particular circumstances where regulations or market forces cannot achieve the practical intentions of Government policy.

However, despite our apprehension about well meaning, short term changes to the regulatory framework, ATUG, in this instance, can and has agreed to legislative action to resolve any possible doubts as to whether some of Telecom's discretionary charging options are permissible.

### ATUG Recommendations

Accordingly, we have submitted to the Department that cost-based charging plans should continue to be permitted, as should non-cost-based plans, so long as any non-cost-based plans do not unduly affect the development of effective and sustainable competition or do not include any bundling provisions that could be considered anti-competitive.

We have suggested that it is anti-competitive to bundle services which are subject to competition with those that are not.

We have recommended that Austel's two-day 'tick and flick' tariff approval process be extended to 10 working days, with a further 10 if Austel requires more time to review the tariff filing.

### Developing Competition

Although the proposed amendments to the *Telecommunications Act* are unlikely to go before the Parliament until November, resolution of the issue of Flexi-Plans and SPAs is critical to orderly development of competition in telecommunications, especially as it comes at a time when many of us are deciding which carrier to preselect.

And, without doubt, that preselection choice will be exercised mainly on the score of the price we pay for telephone service.

**Wally Rothwell**  
Executive Director



**SYDNEY**

Level 11, 80 Alfred Street  
Milsons Point, NSW, 2061  
Australia

Tel: (02) 957 1333, (008) 22 6281

Fax: (02) 925 0880

**MELBOURNE**

Unit 3, 8-12 Sandilands Street  
South Melbourne, VIC, 3205  
Australia

Tel: (03) 690 6395

Fax: (03) 699 9094



# A Ballot Of Choice

*Some have called it the ballot for your dollar, others the ballot of choice. The preselection ballot for users offers, for the first time, the opportunity to choose which telephone company they wish to be serviced by — this ability to choose is what ATUG has been lobbying for within the industry.*

One of ATUG's pursuits is choice for users and the preselection ballot is the mechanism for this choice. From July 15, ATUG members based in Canberra, among other telecommunications users, have had the opportunity to vote for their preferred long distance telephone company.

Phone users in Sydney were scheduled to receive their preselection ballot papers at the beginning of this month, with Melbourne to follow a few weeks later. The non-compulsory ballot will be posted to each household and business with a telephone as part of the Government's policy to promote competition in the industry.

ATUG raised the public profile of the ballot by holding the first public debate during ATUG'93. The response indicated that there was a need for more information on this issue. Members should note that ATUG had been calling for Austel to begin the education campaign since the beginning of this year, but, due to the confidential nature of the negotiations between Telecom and Optus, Austel, acting as the arbitrator, was not at liberty to provide information regarding the ballot.

## Background

The initiative of preselecting one's telephone company came from the Minister for Transport and Communications in 1991, when a Declaration to Preselect one's carrier was made requiring preselection to be made available throughout Australia by 1997. As a result, the preselection ballot will take place in a staged process during the next four years.

The timing of the ballot will be dictated by Optus' network rollout and Telecom's national exchange upgrading program. In addition, the preselection ballot can only take place when 80% of the exchange lines within an Inter-carrier Charging Area have been upgraded to cater for calling line identification.

For example, in the case of Canberra, 95% of the exchanges located in such areas were upgraded in June. The calling line identification information is passed onto Optus for billing purposes.

The initiative of conducting a ballot came from Austel. The ballot is considered as the best means for a permanent arrangement between the carriers and the users. A Heads of Agreement document was signed in May, and Optus, whose prerogative it is to say when a ballot is to be conducted in a particular area, kick-started the process by announcing it would begin the first of the ballots in Canberra on July 15. Other locations will have their ballots six to nine months after the 'Dial 1' option has been in place.

## The Dial 1 Interim Solution

The 'Dial 1' option for service from Optus was established as an interim access measure only, giving Telecom time to program its equipment so that a user's choice can be automatically recognised at the local exchange. Once the choice has been made, the 'Dial 1' option will no longer be available — the connection will be made automatically. However, if no choice is made, then users remain Telecom customers. The ballot is not compulsory, and it is not permanently binding. If users wish to change, they simply dial a four-digit override code — '1411' for Telecom or '1456' for Optus.

## Excluded Services

The services which the preselection ballot covers are long distance calls within Australia and international long distance calls only. The services not affected by preselection are MobileNet, fixed-to-mobile calls, local calls, the 0015 international fax line service, the 008 free call service and CustomNet 13. It is expected that some enhanced services such as virtual private networks will be able to be preselected in the future, pending technical feasibility.

## Your Choice is Important

For businesses, the choice is too important to be made hastily, because an uninformed choice could mean less than optimal sav-

ings in costs or a less efficient use of telecommunications services. ATUG believes that it is also in the interest of businesses and other large users to discuss the matter at the boardroom level before nominating either carrier.

For some, millions of dollars are at stake. The choice may be made on a company policy basis, line-by-line, State-by-State, or on an Australia-wide basis, depending on the size of the organisation.

Large multi-line businesses with offices around Australia will be able to provide the appointed ballot administrator, Price Waterhouse Urwick, with a Letter of Advice before the first ballot. In this way, the choice is made in a coherent manner rather than having everyone in the organisation making the choice as the ballot papers land on their desk.

This will also be a unique opportunity for users to check that their telephone lines

## What Members Are Saying

*"We will select the carrier which offers the best price."* — **Zbigniew Wasilewicz**, Communications Manager, Bankers Trust Australia.

*"We haven't had time to investigate the matter nor have we received any material from either Optus or Telecom."* — **Ron Chambers**, Information Resources Manager, Coca Cola South Pacific.

*"Ballot is not the be all and end all. The black boxes are a brilliant idea."* — **Sheila McGregor**, Partner, Freehill Hollingdale & Page.

*"No decisions yet."* — **John Wise**, Managing Director, Optical Systems Design.

*"Most people will consider Telecom because profits will remain in Australia. Small business will choose Optus and families will choose the best off-peak deals."* — **David Evans**, Group Engineer, NSW Public Works Department.



used tally with those that Telecom claims are used, as the ballot forms will ask for decisions about nominated lines. Such an audit may be made in advance by requesting from Telecom a list of your company's telephone lines that are eligible for pre-selection. It must be mentioned here that Telecom is not under any obligation to present such a list unless requested by users, in advance of the time a particular area comes up for ballot.

Nevertheless, the ballot administrator will provide a printout of the lines for each organisation's locations, as they come up for balloting over the next few years.

Another option for businesses is to program override codes into the PABX. In this way, users may take advantage of least cost routing, as special tariffs are offered by both carriers. Alternatively, the PABX can be programmed with a service provider's code.

### Technical Issues

Users should note that Telecommunications Information Management Systems (TIMS) equipment relying on meter pulses for billing will not be able to cater for long distance calls made using Optus unless the meter pulses are switched off. In this case, charging will be on a 'per-second' basis, which can reduce service bills.

As an alternative, traffic could be split so that some of the calls may be charged for by using the meter pulses and some may be charged on the per-second basis. The advantage here is that the charging for local calls remains based on meter pulses, which is a more accurate way of call charging when using TIMS.

Finally, another issue which must be considered is the fact that long distance calls via Optus do not generate any 'pips,' so interstate calls may be mistaken for local calls and users may be inclined to stay on-line longer than otherwise.

### Your Choices

If businesses decide not to participate in the ballot, they should write a letter to the ballot administrator as notification of their choice to 'opt out' altogether. As mentioned, the vote on the ballot paper does not mean users are locked in. Changing one's choice in the first six months is allowed, and is free.

However, subsequent changes may be tarified at a cost to users of between \$7 and \$10, although it's possible that the carrier winning the customer may foot this

bill, offering it as a complimentary service. The details of this charge have not been confirmed.

Once the choice has been made, users may find out which carrier is servicing their telephone line by dialling '127 111.'

### Another Ballot

A second ballot may be required if the 65% return quota is not met, but with the cost of the ballot at around \$30 million (something like four dollars per customer), this may be too hefty of a price to pay for a repeat performance. This cost will be borne by Telecom and Optus equally.

Overall, it is an expensive exercise, and we, the customers of the carriers, will foot the bill eventually. Nonetheless, ATUG believes that the competitive pressure to keep telephone charges down will mean that users achieve a cost benefit in the long run, and, at the same time, retain their option to choose.

### The Ballot Administrator

Users may write to the ballot administrator by addressing correspondence to: Professor Colin Hughes, Chief Ballot Officer, Pre-selection Ballot Administrator, Level 11,

Capita Centre, Castlereagh St, Sydney, NSW, 2000. There are also special preselection hotlines available to customers. The numbers are: **Ballot Administrator:** 008 062 333; **Optus Communications:** 008 500 500; **Telecom:** 008 626 008.

### Some Advice

ATUG's ACT State Secretary, Anita Gracie, advises members to try Optus and to compare an equivalent telephone bill from Telecom for a period of 30 days. By comparing the figures and the call patterns in this way, users will be able to determine which carrier offers the most cost-effective service.

### The Public Education Campaign

ATUG considers that the education campaign budget should not be skimmed. A 65% voter response rate will be hard enough to achieve, and the cost and inconvenience of a second ballot must be avoided if possible.

It's in Telecom's best interests that voters who want to remain as Telecom customers should express their preference by voting, even if they do not use long distance services or only do so infrequently. **Toula Mantis**

## 1993 INTERDATA HANDBOOK NOW AVAILABLE!

ATUG has sponsored the third edition of the *Interdata Telecommunications Handbook*, published by IDP Interdata Pty Ltd. This easy reference guide to the telecommunications industry is offered to ATUG members at the discount price of \$50, which includes postage and handling. To order, telephone ATUG on (02) 957 1333 or fax your order to (02) 925 0880.

## INTERCEPTION & RECORDING?

Want to find out more about call interception and recording? Or any other topic in the Telecommunications Broadcasting or Radiocommunications legislation? Then you need the EIS Electronic Law Book on disk. The new EIS Electronic Law Book has been released and now includes all the updates to the Telecommunications legislation along with Broadcasting and Radiocommunications legislation.

The publication, on a floppy disk, is available to ATUG members at the special price of \$150 including postage and packaging — a saving of \$50. A subscription including a further two updates is also available to ATUG members for the special price of \$295 — a saving of \$100.

To ensure that you have the legislation at your finger tips at all times, take advantage of this special offer. Contact the ATUG secretariat for details of how to order. Telephone (02) 957 1333.



# Telecom, Optus, CWU & ATUG — Strange Bedfellows

Members will already be aware of ATUG's growing concern for industry training. This is why in May this year, members were asked to comment on ATUG's workshops and seminars. With telecommunications now being seen as an industry in its own right, the formulation of education and training policies for the industry has become another priority.

To this end, four of the main players have been meeting regularly for almost 12 months to construct the advisory and policy formulation mechanisms for training and education within the telecommunications industry. Telecom and Optus Communications may be energetic business rivals, but together with the Communications Workers Union (CWU) and ATUG they have collectively been recognised as the Telecommunications Competency Standards Board (CSB) by the National Training Board.

The CWU has sole union coverage of Optus (under an enterprise agreement

worked out last November) and majority union coverage of Telecom. ATUG has more than 600 member organisations and is effectively the peak user-industry association for the telecommunications industry nationally. Telecom, Optus, the CWU and ATUG may seem like odd bedfellows, but they saw a need to address pressing education and training issues that are specific to the new industry.

Particular attention needs to be paid to changing technical vocation training. This has been predominantly in-house and almost solely under the auspices of Telecom. Competition offers more scope for TAFE and other providers to be involved in curriculum development and training.

The Competency Standards Board intends to address this involvement in particular. Its immediate priorities relate to mapping the industry and developing competency standards. There is every intention to cooperate with similar bodies that may be further advanced in these processes, so that mistakes and duplication can be avoided.

existing and future course structures and certification frameworks.

Much is happening on this front in one of our newest industries. ATUG is pleased to be at the right tables to represent the users' viewpoint in these important strategic forums.

## ATUG IN SOUTH AUSTRALIA

ATUG members in South Australia should take advantage of the guest speaker presentations organised on a monthly basis by the South Australian Committee. Last month, members had the opportunity to meet with Telecom. This month, Optus Communications will be giving a presentation on August 20, 1993. The monthly meetings are held on the third Friday of each month from 4:30pm to 6:00pm. For further information, contact ATUG State Secretary, Peter Hamilton, on (08) 344 6743.

## ATUG IN QUEENSLAND

A one day ATUG seminar and exhibition will be held in Brisbane next month covering issues such as mobiles, cordless telephones, local area networks, CT2, CT3, rural communications, and distance education. A case study will also be presented by the Brisbane City Council. For further information, members should contact Conventions Queensland on (07) 870 8831.

## TITAB Mooted

The CSB intends to consult interested parties within the industry and invite them to become involved. There are also plans to further formalise the relationship between the four parties of the CSB by creating a Telecommunications Industry Training Advisory Board (TITAB). An application for recognition and funding for the TITAB has been lodged with the Department of Education, Employment and Training. If this is approved, an industry training plan is likely to be developed. It will include how this training is recognised and articulated into

## ATUG IN THE HUNTER VALLEY

ATUG has formed a branch covering the Hunter Valley and Newcastle areas of NSW. The inaugural meeting was held in April this year. The appointed branch secretary is Rod Gray (tel: 065 711 124) and John Croxson is deputy secretary (tel: 049 620 942).

Meetings are held on the fourth Thursday of each month at the Hunter Technology Centre, University Drive, Newcastle (adjacent to Newcastle University), commencing at 4:00pm.



### SYDNEY

Level 11, 80 Alfred Street  
Milsons Point, NSW, 2061  
Australia

Tel: (02) 957 1333, (008) 22 6281

Fax: (02) 925 0880

### MELBOURNE

Unit 3, 8-12 Sandilands Street  
South Melbourne, VIC, 3205  
Australia

Tel: (03) 690 6395

Fax: (03) 699 9094



# Engineer In Court Room Drama

*ATUG member and Managing Director of Pollstar Communications, David le Comte, recently wrote an article in ATUG's Newsbrief describing the difficulties with developing standards. In the article, he said he thought most members would agree that without the contribution of the telecommunications professionals and the occasional use of 'bush' lawyer logic, the standards would be far poorer. In this second article, he relates an experience in the courtroom, when his expertise on technical issues was required.*

Recently I was asked by counsel for litigants in a dispute to act as a referee, a role which is similar to that of a judge. Certain non-engineering friends suggested that asking a communications engineer to act as a judge was a bit like asking the local plumber to 'sub' as a heart surgeon. I explained to the lawyers that my comprehensive knowledge of legal matters extended as far as *Rumpole* repeats, and that with respect to these, I always preferred to see myself in the role of *Rumpole*, rather than Judge Bullingham. Their response was that, as a referee, my familiarity with the technical issues at the heart of the dispute was all that was important.

A court orders that a reference be conducted in order to resolve an aspect of the dispute which is considered too technical for the court. This order may or may not have resulted from suggestions by counsel. In my case, both counsels asked the court for a reference.

A reference can be conducted 'in such a manner as the referee thinks fit.' However, the parties at a reference have certain obligations. In fact, 'The parties shall at

all times do all things which the referee requires to enable a just opinion to be reached.' References are usually conducted in a manner which loosely follows standard court room routine.

## Court Procedures

In this regard, witnesses are called and examined, then cross examined and so on. Proceedings are usually recorded and transcripts taken. The referee is required to keep the matters under discussion relevant, and also try to bring the issues faced to some sort of conclusion. Unlike judges, referees will usually ask their own questions of the witnesses. If the questions put to the referee by the court are well defined, the issue of relevance is usually easy to resolve.

Around Philip Street, several firms operate 'private court rooms' which can be rented by the day (or even half day). These 'rooms' offer recording services, photocopying, general secretarial support, on so on. Most rooms offer small adjoining rooms for lawyers to huddle with their clients and witnesses. Furniture and fittings are no more than one would find in any rented conference room.

The referee does not have a high degree of control over how proceedings should be conducted. In my case, a meeting with counsel was held prior to the hearing to discuss how it should be carried out. In a sense, my role as a referee began at that point, as each counsel began to differ on the way in which the reference should be conducted.

For example, each side felt differently about whether certain evidence should be presented. By dissecting arguments logi-

cally, compromises or further alternatives were able to be used to resolve disputes.

## Legal Arguments

Legal counsel are usually quite intelligent. One has to put as much thought (if not more) into analysing their arguments, as they obviously put into formulating them. There are two important tools that a referee can use. The first is their power to state 'I will consider the matter and respond later,' and the second is the ability to review the transcripts and other evidence carefully in the meantime. The task would not be possible without them.

The level of informality in references can vary. Retired judges, who act as referees or arbitrators, are usually more comfortable with proceedings which are as close to standard court room proceedings as possible.

In the reference in which I was involved, strict rules of evidence were not enforced, but witnesses were asked to give their evidence under oath, and the normal order for examinations was generally followed. At many times these normal procedures have to be abandoned in order to accommodate the schedules of witnesses, some of whom came from overseas.

*The second part of David le Comte's article will appear in the September issue of Australian Communications.*

## FREE LEGAL LINE SERVICE

Members are invited to take advantage of ATUG's free Legal Line Service. The service is run by ATUG director and chairman of ATUG's Legal sub-committee, Gerald Wakefield. Members with legal queries in the following areas: international telecommunications law and regulatory policy; radiocommunications; broadcasting and satellite law and policy; computer technology law; and intellectual property law, are advised to consult this free legal advice service by calling ATUG on (02) 957 1333. (A hotline for this service will be made available shortly.)



### SYDNEY

Level 11, 80 Alfred Street  
Milsons Point, NSW, 2061  
Australia

Tel: (02) 957 1333, (008) 22 6281

Fax: (02) 925 0880

### MELBOURNE

Unit 3, 8-12 Sandilands Street  
South Melbourne, VIC, 3205  
Australia

Tel: (03) 690 6395

Fax: (03) 699 9094



## August

**4-7 TUANZ 93**, Ellerslie Function Centre, Auckland. This annual conference and exhibition will explore the issues, applications and converging technologies that will lead the way to the year 2000. The theme of 'Towards 2000' will be addressed from several perspectives: visionary, business, carrier and Pacific. For the first time the exhibition will be open through to Saturday, to enable those operating small businesses to attend. A series of seminars on Saturday, 7 August will be aimed specifically at the educational sector, and will look at the role of telecommunication in distance education, educational TV and other areas of interest. Fee: \$NZ750 (Members), \$NZ975 (Non-members). ATUG members are entitled to attend at the member rate. Enquiries — TUANZ Tel: +64 9 488 1602 Fax: +64 9 489 9515.

**11-13 Open Systems Interconnection**, Hotel Nikko, Potts Point. This conference takes an in-depth look at the Australian Government GOSIP III and AGGOS policies and the move towards an open systems computing environment. Major Unix vendors will discuss their initiatives in open systems, and speakers from government, commercial organisations and industry bodies will discuss their practical experiences. The second day of the conference will focus on OSI, and an optional one-day workshop will be held on Day Three. This event will also be held in Canberra on August 16-18. Fee: Conference only \$1,295; conference and workshop \$1,895; workshop only \$795. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

**11-13 Executive Information Systems**, Hilton Hotel, Sydney. This seminar will explore the emerging opportunities offered by EIS. Eleven leading Australasian organisations will present papers detailing their experiences, and explaining how an EIS can help maintain a competitive edge through strategic management of corporate information. Enquiries — AIC Conferences Tel: (02) 235 1700 Fax: (02) 223 8216.

**16-18 Implementing GSM Networks and Services**, Hotel Intercontinental, Sydney. This conference examines the critical issues surrounding GSM. There will be eight international speakers from France, Sweden, Finland, Germany, Luxembourg and the UK who will discuss issues such as the GSM services and facilities which will be available to users, the implications for GSM technology in the marketplace, how the GSM networks will interface, international roaming issues, and GSM security requirements. There will also be an optional one-day workshop. Fee: Two-day conference \$1,295, One-day workshop \$795, conference and workshop \$1,895. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

**23-25 Developing the Australian Telecommunications Industry**, Golden Gate Hotel, Sydney. This conference will examine the way in which telecommunications industry policy fits into the new and expanding framework of competition in Australia. Delegates will be appraised of the latest legal and policy issues, as well as market opportunities in Asia for telecommunications equipment and services exporters. Also discussed will be the future of IDAs and the Partnership Program. Austel and the Ballot Administrator will speak on the preselection ballot, regulation of convergence and total deregulation of the industry in 1997. Fee: Two days \$1,295, Three days \$1,895. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

**23-27 Interop 93**, Moscone Convention Center, San Francisco, California. The theme of this year's Interop is 'At Work and Working Together,' and the conference and exhibition program promises more than 400 industry-leading network computing and open systems companies. There will be over 110 conference sessions, tutorials and workshops, and attendees can see state-of-the-art solutions and be shown how these new products interoperate with the widely installed technologies of today. Courses from beginner to expert level are offered, and this year there are new one-day training workshops especially designed for those with tight schedules. Enquiries — Interop Company, Tel: +1 415 941 3399 Fax: +1 415 949 1779.

**31 Quality Certification**, Renaissance Hotel, Sydney. This course provides a practical guide to obtaining registration to one of the ISO9000/AS3900 quality assurance system standards, via presentations by a range of leading companies and two in-depth case studies. There is also the option to enrol in a two-day workshop following the conference. Fee: One-day conference \$795, Two-day workshop \$1,295, Conference and workshop \$1,795. Enquiries — AIC Conferences Tel: (02) 235 1700 Fax: (02) 223 8216.

## September

**1-2 Managing R&D for Business Success**, Renaissance Hotel, Sydney. Delegates to this two-day conference will have the opportunity to hear presentations from top level executives from some of Australia's most innovative local and international companies. Issues covered will include developing an infrastructure for cost-effective R&D, assessing successful management techniques, collaboration between the public and private sectors, implementing tools for accelerating product development, utilising government programmes, and new Asian initiatives and opportunities for Australia. Fee: Two-day conference \$1,295, Workshop and conference \$1,595. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

**1-3 Asia Pacific Mobile Communications — Implementing GSM & USDC**, Shangri-La Hotel, Singapore. This annual conference looks at developing strategies in mobile communications in the Asia Pacific region. It will focus on implementation strategies for GSM and USDC, and includes a comparison of GSM in Europe, USDC in the US, and JDC in Japan, as well as examining competing technologies such as CT2. A technical day covers the practicalities of creating a successful and profitable network. Fee: \$S2,350. Enquiries — IBC Technical Services Tel: +65 732 1970.

**14-15 Cordless Communications**, Park Lane Hotel, Sydney. Featuring speakers from the UK, Finland, US, Hong Kong and Holland, this conference examines the potential of new cordless communications technologies, including: CT-2, DECT and wireless local area networks. An optional additional conference to be held on September 16 will explore applications for wireless LANs. Fee: Two-day conference \$1,295; optional day \$795. Enquiries — IIR Conferences Tel: (02) 954 5844 Fax: (02) 959 4684.

**20-22 Understanding Data Communications Networks**, Maritime Conference Centre, Sydney. This course aims to give professionals working in data communications a thorough grounding in communications protocols and standards, modem terminology and technology, hardware and software interfaces, multiplexers, and transmission media and their uses. Fee: \$1,445. Enquiries — ITT Training Tel: (02) 959 5990 Fax: (02) 956 6375.

**27-1/10 ASWEC '93**, Hyatt Kingsgate, Sydney. The 7th Australian Software Engineering Conference has the theme this year of 'Software Quality and Other Urban Myths,' and will feature papers on CASE, development environments, management of software developments and technical innovations. Enquiries — Institution of Radio and Electronics Engineers Australia Tel: (02) 327 4822 Fax: (02) 362 3229.

## October

**12-14 The Inmarsat International Conference and Exhibition on Mobile Satellite Communications**, CNIT, Paris. The first Inmarsat conference and exhibition in 1989 focused on the development of mobile communications. This year the conference will be addressing the future of mobile satellite communications, and senior-level speakers will present their views on a range of issues covering all aspects of the industry. The format will consist of plenary and streamed sessions, and there will also be a series of open forums. The exhibition will show the latest equipment in the field of mobile satellite communications. Enquiries — Tania Starley, IBC Technical Services Tel: +44 71 637 4383 Fax: +44 71 631 3214.

**23-24 Cable and Satellite Broadcasting**, Sheraton Towers, Singapore. With the launch of three new satellites in the Asian region — Thaicom, AsiaSat 2 and Apstar 1 — the satellite industry in Asia is poised for dramatic growth. This conference will look at a wide range of related issues, including new technological advancements such as digital compression and future developments such as interactive TV, regional regulation, the growth of marine satellite communications, business strategies and venture capital developments in Pay TV, and special country presentations from Malaysia, Hong Kong, Thailand and Singapore. Fee: \$S1,395. Enquiries — IBC Technical Services +65 732 1970 Fax: +65 733 5087.

**24-27 The IREE Communications Conference**, Hilton International Hotel, Melbourne. The IREE has announced this new conference, which will replace the former IREECON. This year's inaugural event will have the theme 'Communications: Foundations for the Future,' and will run streams on radiocommunications, telecommunications and industry support. The keynote speaker will be the newly elected Director of the ITU Telecommunications Development Bureau, Mr Arnold Djiwatampu. A highlight of the three day event will be a special 'Hypothetical' session featuring a panel of key industry figures. There will also be a trade exhibition of the latest technology and equipment. Enquiries — Tel: (02) 327 4822 Fax: (02) 362 3229.

## November

**16-18 Middle East & Gulf Mobile Communications — Implementing New Digital Mobile Communications Systems**, InterContinental Hotel, Dubai. Concentrating on GSM and being held at a critical time in the region's development of mobile systems, this conference will examine operational experiences with the implementation of GSM cellular networks, the issues surrounding standards and roaming, and the future impact of other mobile services. A technical day will allow delegates to understand the practicalities of building a successful and profitable network. Enquiries — IBC Technical Services Tel: +44 71 637 4388 Fax: +44 71 631 3214.

**28-1/12 ACOFT-18 '93**, Northbeach Parkroyal Hotel, Wollongong. The 18th Australian Conference on Optical Fibre Technology will cover the latest research, developments, production applications and business strategies of optical fibres, waveguides, sources, detectors and other services for the telecommunications and sensors industries. A trade exhibition will be held in conjunction with the conference. Enquiries — Conference Secretary, IREE Tel: (02) 327 4822 Fax: (02) 362 3229.



# *Chosen by the most discerning Business and Government Institutions*

**IQ INTERQUARTZ®**

*The market leaders in  
Business Phones*



**IQTEL 500**

**MORE FEATURES  
AT A BUDGET PRICE**

- Liquid crystal display
- Manual timer
- On hook / monitor dialling with auto release
- 13 memory capacity, 10 two touch, 3 one touch, all 16 digit capacity
- Swing out index label
- Hearing aid compatible
- Optional headset support
- Plus all IQTEL common features
- Colour Grey
- Two year warranty

**INTERQUARTZ (A'ASIA) PTY. LTD**

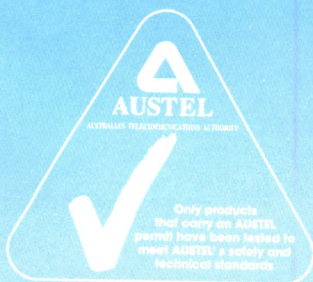
**MELBOURNE**  
42 Dougharty Road  
West Heidelberg VIC 3081  
Telephone (03) 457 5000  
Fax (03) 458 4049

**CANBERRA**  
Telephone (06) 243 4866  
Fax (06) 243 4848

**SYDNEY**  
8 Pioneer Avenue  
Thornleigh NSW 2120  
Telephone (02) 875 4011  
Fax (02) 875 4146

**BRISBANE**  
4/12 Tolmer Place  
Spingwood QLD 4127  
Telephone (07) 808 8008  
Fax (07) 808 8666

**TOLL FREE 008 333 131 AUSTRALIA**







*YOU'LL BE AMAZED!*

## A PABX so advanced it actually talks to you.

These days, most PABX systems have a host of helpful features.

Unfortunately, most people can never remember how to use all of them.

That's why the new Alcatel 4300 has "Voice Prompt". It actually tells you how to use the system. For example, if you dial a busy extension, Voice Prompt will tell you a number to press to ensure a call back, or how to be automatically connected when the line is free. Of course, this is only one of many useful Voice Prompts. And Voice Prompt is only one of many features.

Alcatel Australia. We're Australia's largest communications company, because we know how to compete.



For more information, send to Alcatel Australia, P.O. Box 488 North Sydney 2060 or fax to (02) 925 7242

Name \_\_\_\_\_ Title \_\_\_\_\_ Company \_\_\_\_\_

Address \_\_\_\_\_ Postcode \_\_\_\_\_

☐ Send me product literature ☐ Call me to arrange a demonstration.